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THE

SILVA OF NORTH AMERICA

A DESCRIPTION OF THE TREES WHICH GROW NATURALLY IN NORTH AMERICA EXCLUSIVE OF MEXICO

BY

CHARLES SPRAGUE SARGENT

DIRECTOR OF THE ARNOLD ARBORETUM
OF HARVARD UNIVERSITY

Illustrated with Figures and Analyses drawn from Nature

BY

CHARLES EDWARD FAXON

AND ENGRAVED BY

PHILIBERT AND EUGÈNE PICART

VOLUME IV.

ROSACEÆ—SAXIFRAGACEÆ

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To

HORATIO HOLLIS HUNNEWELL,

A TRUE LOVER OF TREES,

AND

A WISE AND GENEROUS PATRON OF THE ARTS AND SCIENCES,

THIS FOURTH VOLUME OF

THE SILVA OF NORTH AMERICA

IS DEDICATED

SYNOPSIS OF THE ORDERS OF PLANTS CONTAINED IN VOLUME IV. OF THE SILVA OF NORTH AMERICA.

CLASS I. **DICOTYLEDONOUS or EXOGENOUS PLANTS.**

Stems increasing in diameter by the annual addition of a layer of wood inside the bark. Leaves netted-veined. Embryo with a pair of opposite cotyledons.

SUB-CLASS I. **Angiospermæ.** Pistil, a closed ovary containing the ovules and developing into the fruit.

DIVISION I. **Polypetalæ.** Flowers with calyx and corolla, the latter divided into separate petals.

C. CALYCIFLORÆ. Sepals rarely distinct. Disk adnate to the base of the calyx, rarely tumid or conspicuous or wanting (Mimosæ). Petals usually as many as the lobes of the calyx, or fewer by abortion, inserted on the margin of the calyx-tube or of the disk, occasionally wanting. Stamens definite or indefinite, perigynous or hypogynous. Ovary superior.

20. **Rosaceæ.** Flowers usually regular. Stamens distinct, usually indefinite. Carpels 1-many, distinct or (in Pomeæ) united and combined with the calyx-tube. Style often lateral or basal. Ovules usually 2, anatropous. Seeds generally exalbuminous. Leaves usually alternate, dentate, lobed or divided, usually stipular.

21. **Saxifragaceæ.** Flowers usually regular. Stamens mostly 5 to 10. Carpels usually 2, united or rarely free. Ovules numerous, anatropous. Styles free or united at the base. Seeds albuminous. Leaves opposite or alternate, stipular or exstipular.

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SILVA OF NORTH AMERICA.

CHRYSOBALANUS.

FLOWERS perfect; calyx 5-lobed, the lobes imbricated in æstivation; petals 5, imbricated in æstivation; stamens 15 to 50; ovary 1-celled; ovules 2, ascending. Fruit a fleshy drupe, 1-seeded. Leaves alternate, entire.

Chrysobalanus, Linnæus, *Gen.* 365. — A. L. de Jussieu, *Gen.* 340. — Meisner, *Gen.* 102. — Endlicher, *Gen.* 1251. — Bentham & Hooker, *Gen.* i. 606. — Baillon, *Hist. Pl.* i. 480.

Icaco, Adanson, *Fam. Pl.* ii. 305.

Trees or shrubs, with stout branchlets covered with pale lenticels, and fibrous roots. Leaves alternate, entire, coriaceous, short-petiolate, persistent; stipules minute, deciduous. Flowers short-pedicellate, small, creamy white, in axillary or terminal dichotomously-branched silky canescent cymes with divisions developed from the axils of conspicuous deciduous bracts. Calyx turbinate-campanulate, five-lobed, ebracteolate, deciduous. Disk thin, adnate to the calyx-tube. Petals five, inserted in the mouth of the calyx-tube on the margin of the disk, alternate with the lobes of the calyx, spatulate, deciduous. Stamens fifteen, in groups of three opposite the lobes of the calyx, or indefinite in a single continuous series, inserted with the petals on the margin of the disk; filaments filiform, free or slightly connate at the base; anthers ovoid, introrse, two-celled, the cells opening longitudinally, or sometimes wanting. Ovary sessile in the bottom of the calyx-tube, hirsute or glabrous, one-celled; style rising from the base of the ovary, filiform, terminated by a minute truncate stigma; ovules two, collateral, ascending, anatropous; raphe dorsal, the micropyle inferior. Fruit drupaceous; epicarp smooth, membranaceous; mesocarp pulpy; putamen coriaceous or crustaceous, more or less adherent to the mesocarp, smooth and indehiscent, or five or six-angled toward the base and imperfectly five or six-valved, the valves reticulate-veined. Seed suberect, exalbuminous; testa chartaceous, light brown. Embryo filling the cavity of the seed; cotyledons thick and fleshy; radicle inferior, very short.

The genus Chrysobalanus is represented in the southern Atlantic states by a shrubby species[1] confined to the coast region of Georgia, Florida, and Alabama; and a second species which occasionally attains the size of a small tree inhabits the shores of southern Florida, and is widely distributed through the maritime regions of tropical America, and, in various forms which have sometimes been considered species, along the coast of western tropical Africa.[2]

[1] *Chrysobalanus oblongifolius*, Michaux, *Fl. Bor.-Am.* i. 283. — Pursh, *Fl. Am. Sept.* i. 329. — Nuttall, *Gen.* i. 301. — Elliott, *Sk.* i. 539. — De Candolle, *Prodr.* ii. 526. — Torrey & Gray, *Fl. N. Am.* i. 406. — Chapman, *Fl.* 119.

Persea longipeda, Bertoloni, *Misc. Bot.* fasc. xiii. t. 2.

[2] Alphonse de Candolle (*Géographie Botanique*, ii. 784, 792) was inclined to believe that *Chrysobalanus Icaco* was of American origin, and had been naturalized on the African coast by seed carried from one continent to the other by the Atlantic currents, or by man. The view that it was transported across the Atlantic from the New World to the Old by ocean currents is supported by the fact that the early European travelers found the Cocoa Plum in

The generic name, from *χρυσός* and *βάλανος*, was established by Linnæus, who discarded Plumier's name of Icaco.[1]

America ; the seeds, too, are well suited to float, their structure protecting them for a long time from the influence of salt water, and as the species inhabits the shores of the ocean the seed washed up on such shores would find suitable conditions for germination. The Cocoa Plum, moreover, grows spontaneously in Africa only on the west coast, or opposite America, while in the New World it is as common on the Pacific as on the Atlantic seaboard. On the other hand, the fact that the French in Senegal call it Prune d'Amérique might indicate that it had first been carried to Africa by man, and then, having become naturalized, had gradually spread along the coast.

[1] *Nov. Pl. Am. Gen.* 43, t. 5.

CHRYSOBALANUS ICACO.

Cocoa Plum.

STAMENS indefinite. Stone 5 or 6-angled, imperfectly 5 or 6-valved. Leaves broadly elliptical or round-obovate.

Chrysobalanus Icaco, Linnæus, *Spec.* 513 (excl. vars.). — Jacquin, *Enum. Pl. Carib.* 23; *Stirp. Am.* 154, t. 94; *Select. Stirp. Am. Hist.* 75, t. 141. — *Icon. Am. Gewäch.* ii. 36, t. 157. — Aublet, *Pl. Guian.* i. 513. — Houttuyn, *Syst.* i. 756, t. 11, f. 2. — Lamarck, *Dict.* iii. 224; *Ill.* ii. 542, t. 428. — Willdenow, *Spec.* ii. pt. ii. 998. — Persoon, *Syn.* ii. 36. — Rees, *Cyclopædia*, viii. — Poiret, *Lam. Dict.* Suppl. iii. 135. — Lunan, *Hort. Jam.* i. 211. — Humboldt, Bonpland & Kunth, *Nov. Gen. et Spec.* vi. 244. — Kunth, *Syn. Pl. Æquin.* iii. 483. — De Candolle, *Prodr.* ii. 525. — *Dict. Sci. Nat.* xxii. 430, t. 236. — Sprengel, *Syst.* ii. 478. — Tussac, *Fl. Antill.* iv. 91, t. 31. — Maycock, *Fl. Barb.* 215. — Don, *Gen. Syst.* ii. 477. — Spach, *Hist. Vég.* i. 369, t. 5, f. 4. — Torrey & Gray, *Fl. N. Am.* i. 406. — Dietrich, *Syn.* iii. 46. — Walpers, *Rep.* ii. 1; *Ann.* iv. 642. — Bentham, *Bot. Voy. Sulphur*, 91. — Blume, *Mus. Bot. Lugd. Bat.* ii. 90. — Richard, *Fl. Cub.* ii. 237. — Chapman, *Fl.* 119. — Grisebach, *Fl. Brit. W. Ind.* 229. — Schnizlein, *Icon.* t. 274. — Baillon, *Adansonia*, vii. 221; *Hist. Pl.* i. 427, f. 486, 487. — Hooker f. *Martius Fl. Brasil.* xiv. pt. ii. 7. — Hemsley, *Bot. Biol. Am. Cent.* i. 365. — Eggers, *Bull. U. S. Nat. Mus.* No. 13, 50. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 64.

Chrysobalanus Icaco, *β.* **purpureus**, Persoon, *Syn.* ii. 36.

A tree, twenty-five to thirty feet in height, with a long straight trunk occasionally a foot in diameter, or more often a tall broad bush with many upright virgate branches, or often, in exposed situations, a semiprostrate shrub a foot or two high. The bark of the trunk is an eighth of an inch thick, with a light gray surface tinged with red which separates into long thin scales. The branches, when they first appear, are glabrous or sometimes slightly pilose and dark reddish brown; they are soon marked with conspicuous pale lenticels, and in their second year are brown or gray-brown. The leaves are broadly elliptical or round-obovate, rounded or slightly emarginate at the apex, and wedge-shaped at the base; they are borne on short stout petioles, and are glabrous, coriaceous, obscurely reticulate-veined, dark green and lustrous on the upper, and light yellow-green on the lower surface, with broad conspicuous midribs rounded on the upper side, and thin primary veins; they vary from an inch to three inches and a half in length, and from an inch to two inches and a half in width, and, standing on the branches at an acute angle, seem to be pressed against them. The stipules are acuminate, an eighth of an inch in length, and early deciduous. The flowers are produced in cymes one to two inches in length, which in Florida appear continuously on the growing branches during the spring and summer months; they are borne on short thick club-shaped pedicels which, like the acute deciduous bracts and bractlets, and the outer surface of the calyx, are covered with thick hoary tomentum. The calyx-lobes are nearly triangular, acute, more or less pubescent on the inner surface, and half the length of the narrow spatulate white petals. The stamens are exserted, with slender hairy filaments, and are sometimes abortive on one side of the flower by the suppression of some of the anthers. The ovary is covered with hoary pubescence, and from its base rises the long slender style, clothed nearly to the apex with pale hairs. The fruits, of which one or two only develop from an inflorescence, are nearly spherical, or often slightly ovoid, and from two thirds of an inch to an inch and a half in diameter; the skin is smooth, bright pink, yellow, purple, creamy white, or sometimes nearly black; the flesh is white, sweet, and juicy, often a quarter of an inch thick, and more or less adherent to the stone. This is pointed at both ends, five or six-angled, especially below the middle, half an inch to an inch and a quarter in length and twice as long as broad, indehiscent, or finally dehiscent into five or six valves; the wall is composed of a thin red-brown dry outer layer, and a thick

interior layer of hard woody fibre, or in the black-fruited form is thin and soft. The testa of the seed is thin and papery, light red-brown, and lined with a thick white reticulated fibrous coat.

Chrysobalanus Icaco grows in Florida from Cape Canaveral to the shores of Bay Biscayne, and on the west coast from Caximbas Bay to the southern keys. It is common on the shores of the Antilles and on those of southern Mexico and Central America; it is found on the northern and eastern coasts of South America, where it extends as far south as southern Brazil, and occurs on the west coast of Africa from Senegambia to the Congo country.[1] In Florida the Cocoa Plum is usually shrubby, and attains the size and habit of a tree only on the shores of the islands of the Everglades, in the neighborhood of Bay Biscayne, and on the banks of the Miami River above the influence of tide-water, where it sometimes forms dense impenetrable thickets of considerable extent.

The wood of *Chrysobalanus Icaco* is heavy, hard, strong, and close-grained, and contains a few irregularly distributed open ducts and many thin medullary rays; it is light brown, often tinged with red, with thin lighter colored sapwood composed of ten or twelve layers of annual growth. The specific gravity of the absolutely dry wood is 0.7709, a cubic foot weighing 48.04 pounds.

The fruit, which resembles a plum in size and shape, is sweet and rather insipid; it varies in color and in the amount of juice contained in the flesh, in the degree to which this adheres to the stone, and in the thickness of the wall of the stone.[2] It appears to have been a favorite food of the Caribs at the time of the discovery of America, and it is mentioned in many of the early narratives.[3] It is eaten by negroes and sometimes by whites, both fresh and preserved in sugar. The seeds when fresh have an agreeable odor, although they soon become rancid, and are considered a delicacy in the West Indies; they contain a considerable quantity of oil, and under the name of varach seeds are sometimes sent to England from tropical Africa; strung on sticks, they are used instead of candles by the natives.[4] The

[1] Guillemin, Perrottet & A. Richard, *Fl. Seneg. Tent.* i. 272. — Hooker f. & Bentham, *Hooker Niger Fl.* 336. — Oliver, *Fl. Trop. Afr.* ii. 365.

[2] In Florida *Chrysobalanus Icaco* varies but little in the size and shape of the leaves, or in the form of the fruit. This is usually pink, or occasionally nearly white; on some individuals, however, it is black, and then is smaller and more or less ovate, with narrower and rather softer stones than occur in the more spherical pink or white-skinned fruit, the two forms apparently never growing on the same plant. Within the tropics it shows a greater tendency to variation. Hooker f. (*Martius Fl. Brasil.* xiv. pt. ii. 7) considered the American and African plants specifically identical, and proposed these varieties: —

α. *genuinus:* leaves broadly obovate, obcordate, or orbiculate; drupe fleshy, ovoid or obovoid, obtusely ribbed.

β. *pellocarpus:* leaves as in the variety α, although often smaller; drupe obovoid, narrowed at the base, subacutely ribbed; flesh thin.

Chrysobalanus pellocarpus, Meyer, *Prim. Fl. Esseq.* 193. — Bentham, *Hooker Jour. Bot.* ii. 214. — Grisebach, *Fl. Brit. W. Ind.* 229.

Chrysobalanus Icaco, var. β. *pellocarpus*, De Candolle, *Prodr.* ii. 525.

Guiana.

γ. *ellipticus:* leaves elliptical-oblong, acute or subacute at the two extremities; drupe as in variety α, but smaller.

Chrysobalanus ellipticus, Sabine, *Trans. Hort. Soc. Lond.* v. 453. — De Candolle, *Prodr.* ii. 526. — Hooker f. & Bentham, *l. c.* — Oliver, *l. c.*

(?) *Chrysobalanus luteus*, Sabine, *l. c.* — De Candolle, *l. c.*

Upper and Lower Guinea.

To this form, too, should perhaps be referred the African *Chrysobalanus orbicularis*, Schumacher & Thonning, *Kongl. Dansk. Vidensk. Selsk. Afh.* iv. 6; *Pl. Guin.* ii. 5. — Walpers, *Rep.* ii. 907.

[3] *De los árboles é fructas llamados hicacos*, Oviedo, *Hist. Nat. Gen. Ind.* lib. viii. cap. 9.

"La Fruta de Cuesco son Hobos, Hicacos, Macaguas, Guiabaras, i Mameis, que es la mejor de todas." (Francisco Lopez de Gomara, *Hist. Gen. de las Indias*, cap. xxviii.)

Arbor folia fert similia Lauri foliis, Marcgrave, *Hist. Nat. Bras.* lib. iii. cap. ix. (cum icone).

Des Prunes de Icaques. "Ce fruit est fort dous, & tellement aimé de certains Sauvages, qui demuerent pres du Golfe d'Hondures, qu'on les appelle *Icaques*, à cause de l'état qu'ils font de ces Prunes, qui leur servent de nourriture." (Rochefort, *Hist. Nat. et Morale des Antilles*, 74 [cum icone].)

Prunier d'Icaque. "Il y en a de plusieurs especes, qu'on distingue seulement par la couleur du fruit, dont les uns sont rouges, les autres violets, les autres blancs, mais tous de même forme, même chair, même goût, même vertu." (Labat, *Nouveau Voyage aux Isles de l'Amérique*, iii. 40.)

Frutex cotini fere folio crasso in summitate deliquium patiente, fructu ovali cæruleo ossiculum angulosum continente, Catesby, *Nat. Hist. Car.* i. 25, t. 25.

Chrysobalanus, Linnæus, *Hort. Cliff.* 484 (excl. syn.). — Plumier, *Pl. Am.* ed. Burmann, 151, t. 158.

The Fat Pork-Tree, Griffith Hughes, *Nat. Hist. Barbados*, 180.

Chrysobalanus fruticosus, foliis orbiculatis alternis, floribus laxe racemosis, Browne, *Nat. Hist. Jam.* 250, t. 17, f. 5.

Icaquier, Nicolson, *Essai sur l'Histoire Naturelle de l'Isle de Saint-Domingue*, 248.

Chrysobalanus seu Icaco, fructu nigro, fructu albo, fructu violaceo, Pouppé Desportes, *Histoire des Maladies de S. Domingue*, iii. 244.

[4] Spons, *Encyclopædia of the Industrial Arts, Manufactures, and Raw Commercial Products*, ii. 1414. — Tussac, *Fl. Antill.* iv. 92.

bark, leaves, and roots are astringent, and have been employed in tropical America in the treatment of diarrhœa, leucorrhœa, and hemorrhages.[1]

The earliest mention[2] of *Chrysobalanus Icaco* as an inhabitant of Florida appears in *A Concise Natural History of East and West Florida*, written by the distinguished engineer Bernard Romans,[3] and published in New York in 1775.

Chrysobalanus Icaco was introduced into the Physic Garden at Chelsea in England by Philip Miller[4] in 1752,[5] and is occasionally cultivated in tropical regions of the Old World.[6]

Icaco, the specific name, is probably of Carib origin.[7]

[1] Tussac, *Fl. Antill.* iv. 92. — Endlicher, *Enchirid. Bot.* 665. — *Treasury of Botany*, i. 278. — Martius, *Fl. Brasil.* xiv. pt. ii. 75. — Baillon, *Hist. Pl.* i. 459.

[2] "A few spots of *hammock*, or upland, are found on this island; these produce the *zantoxylum*, ficus citri-folio, Coccoloba, Mastic, Borassus, and a few trees of the live oak and willow oak, the Chrysobalanus, & the *Cereus Triangularis*, and with these that kind of *Cactus* commonly called *Opuntia*," 283.

[3] Bernard Romans, a native of Holland, received in England the education of an engineer, and was afterwards employed by the English government as a surveyor in the southern colonies of North America. He appears to have lived from 1763 to 1771 in Florida, where he paid some attention to natural history, enjoying a salary of fifty pounds a year as King's Botanist. During his residence in New York Romans became imbued with the revolutionary spirit and was engaged by the Committee of Safety to prepare a scheme for the defense of the Highlands; but his relations with the committee were unsatisfactory, his plans were not adopted, and he was relieved from duty. In 1776 he was commissioned captain of a company of Pennsylvania artillery. Charges of misconduct were soon preferred against him, but he was probably acquitted, as not long afterwards he was deputed by General Gage to inspect the works at Fort Ann and Skenesborough, and in 1780 was ordered to South Carolina to join the Southern Army. Romans sailed from New Haven or New London in a vessel which was captured by the British and taken to Jamaica, where he was held as a prisoner until the end of the war in 1783, when he was put on board of a ship bound for the United States. He died on the voyage, his friends believed a violent death (see Munsell's Historic Series, No. 5, *Obstructions to the Navigation of Hudson's River*, by E. M. Ruttenber, Introduction, 9). In addition to the work on Florida, of which only the first volume appeared, and which is now an extremely rare book, as the largest part of the edition was destroyed by fire in New York, Romans, who was a member of the American Philosophical Society, printed in 1773, in its Transactions, a paper on *The Marine Compass;* in 1775 he published *A Map of the Civil War in America;* in 1778, at Hartford, Connecticut, the first volume of his *Annals of the Troubles in the Netherlands*, the second volume of which appeared four years later, and in 1779, with J. G. W. de Braham, *A Complete Pilot for the Gulf Passage.* The History of East and West Florida is a work of no little interest to botanists, as Romans was the first person with any knowledge of plants who visited the coasts and islands of southern Florida; it gives the earliest account of the Ogeechee Lime, and of the Florida Fig, *Ficus aurea*, and first makes known the fact that several West India trees are found on the Florida coast.

[4] See i. 38.

[5] Aiton, *Hort. Kew.* ii. 166.

[6] Voigt, *Hort. Sub. Calcutt.* 265. — Hooker f. *Fl. Brit. Ind.* ii. 307. — Naudin, *Manuel de l'Acclimateur*, 204.

[7] *Hicacos* was first used by Oviedo y Valdes (*Hist. Nat. Gen. Ind.* lib. viii. cap. 9), who landed in San Domingo in 1514, to describe the fruit of this plant, which has given its name to numerous capes and points of land on the coast of the West Indies and Central America.

EXPLANATION OF THE PLATE.

Plate CXLVIII. Chrysobalanus Icaco.

1. A flowering branch, natural size.
2. Diagram of a flower.
3. A flower, enlarged.
4. Vertical section of a flower, enlarged.
5. Front and rear views of a stamen, enlarged.
6. A pistil, a vertical section of the ovary removed, enlarged.
7. An ovule, much magnified.
8. A fruiting branch, natural size.
9. Vertical section of a fruit, natural size.
10. A stone, natural size.
11. An embryo, natural size.

C.E. Faxon del.

Picart fr. sc.

CHRYSOBALANUS ICACO, L.

A. Riocreux direx.t

Imp. R. Taneur, Paris.

PRUNUS.

FLOWERS perfect, or rarely polygamo-diœcious by abortion; calyx 5-lobed, the lobes imbricated in æstivation; petals 5, imbricated in æstivation, rarely wanting; stamens 15 to 30; pistil 1, rarely 2 or more; ovules 2, suspended. Fruit a more or less fleshy drupe, 1-seeded. Leaves alternate.

Prunus, Bentham & Hooker, *Gen.* i. 609. — Baillon, *Hist. Pl.* i. 478.
Amygdalus, Linnæus, *Gen.* 141. — Adanson, *Fam. Pl.* ii. 305. — A. L. de Jussieu, *Gen.* 341. — Meisner, *Gen.* 102. — Endlicher, *Gen.* 1250.
Prunus, Linnæus, *Gen.* 141. — Adanson, *Fam. Pl.* ii. 305. — A. L. de Jussieu, *Gen.* 341. — Meisner, *Gen.* 102. — Endlicher, *Gen.* 1250.
Cerasus, Linnæus, *Gen.* 141. — Adanson, *Fam. Pl.* ii. 305. — A. L. de Jussieu, *Gen.* 340. — Meisner, *Gen.* 102.
Padus, Linnæus, *Gen.* 142.
Armeniaca, A. L. de Jussieu, *Gen.* 341. — Meisner, *Gen.* 102.
Amygdalophora, Necker, *Elem. Bot.* ii. 70.
Trichocarpus, Necker, *Elem. Bot.* ii. 70.
Prunophora, Necker, *Elem. Bot.* ii. 71.
Cerasophora, Necker, *Elem. Bot.* ii. 71.
Chimanthus, Rafinesque, *Fl. Ludovic.* 26.
Persica, Meisner, *Gen.* 102.
Ceraseidos, Siebold & Zuccarini, *Abhand. Akad. Münch.* iii. 743.
Amygdalopsis, Roemer, *Fam. Nat. Syn.* iii. 15.
Laurocerasus, Roemer, *Fam. Nat. Syn.* iii. 89
Microcerasus, Roemer, *Fam. Nat. Syn.* iii. 93.
Emplectocladus, Torrey, *Smithsonian Contrib.* vi. 10, t. 5 (*Pl. Fremont.*).
Tubopadus, Pomel, *Mat. pour la Flore Atlant.* 8.

Trees or shrubs, with bitter and astringent properties, and scaly buds with scales imbricated in many rows, those of the inner rows accrescent and often colored. Leaves conduplicate or convolute in vernation, alternate, simple, usually serrate, petiolate, deciduous or persistent; stipules free from the petiole, usually lanceolate and glandular, often minute, deciduous. Flowers solitary or in fascicled corymbs or racemes, appearing from separate buds before, coetaneous with, or later than, the leaves, or on leafy branches. Calyx five-lobed, ebracteolate, the tube obconic, urseolate, or tubular, deciduous or rarely persistent. Disk thin, adnate to the calyx-tube, glandular, often colored. Petals white or rose-colored, inserted in the mouth of the calyx-tube on the margin of the disk, deciduous or rarely wanting. Stamens usually fifteen to twenty, inserted with the petals in three rows, those of the outer row ten, parapetalous, those of the next row opposite the sepals and alternate with those of the inner row; or sometimes thirty in three rows; filaments filiform, free, incurved in the bud; anthers oval, attached on the back, introrse, two-celled, the cells opening longitudinally. Gynœcium unicarpellate, or rarely composed of two or more carpels, rarely suppressed by abortion; ovary inserted in the bottom of the calyx-tube, one-celled; style terminal, dilated at the apex into a truncate stigma; ovules two, suspended, collateral, anatropous; raphe ventral, the micropyle superior. Fruit drupaceous; epicarp membranaceous, often glaucous or velutinous; mesocarp pulpy, or dry and coriaceous and two-valved; putamen bony, smooth, rugose, or foraminulose, compressed, indehiscent, one or rarely two-seeded. Seed suspended; testa thin, membranaceous; albumen thin, or usually wanting. Cotyledons thick and fleshy; the radicle superior.[1]

[1] The genus Prunus may be divided into the following sections, which by many authors have been considered genera: —

AMYGDALUS (including Amygdalophora, Trichocarpus, Persica, and Amygdalopsis). Flowers solitary or geminate, subsessile, often precocious. Fruit velutinous or rarely smooth; the flesh dry and membranaceous and splitting irregularly, or thick and succulent; the stone compressed, generally thick-walled, rugose and deeply pitted. Leaves conduplicate in vernation.

EMPLECTOCLADUS. Flowers solitary or geminate, short-pedicellate, appearing with the leaves. Fruit velutinous, with thin dry flesh, and a smooth or slightly rugose stone. Leaves conduplicate in vernation.

ARMENIACA. Flowers solitary or geminate, subsessile or short-pedicellate, precocious. Fruit pubescent, or in cultivation rarely smooth, with succulent flesh, and a thick-walled conspicuously wing-margined smooth or pitted stone. Leaves convolute in vernation.

PRUNUS (including Prunophora). Flowers pedicellate in fascicled umbels, precocious or coetaneous with the leaves. Fruit more or

Of the genus Prunus, now extended to include the Plums, Almonds, Peaches, Apricots, and Cherries, about one hundred and twenty species are distinguished. They are generally distributed over the temperate regions of the Northern Hemisphere, especially in eastern Asia,[1] in western and central Asia,[2] Europe,[3] and North America.[4] The genus is represented in tropical America by numerous species,[5] and occurs in southern Asia.[6] It has no representative in tropical and southern Africa, in Australia, Polynesia, or the southern countries of South America. In North America the genus is spread from the shores of the Atlantic to those of the Pacific, and from near the northern limits of tree-growth to southern Mexico. The territory of the United States contains at least twenty-five indigenous species, of which fourteen attain arborescent habit, and one is a large and important forest tree.[7]

less succulent, often covered with a glaucous bloom; stone compressed, smooth or slightly rugose, acute-margined along the ventral suture, grooved on the other. Leaves conduplicate or convolute in vernation.

CERASUS (including Cerasophora, Ceraseidos, and Microcerasus). Flowers pedicellate, fascicled, or corymbose, precocious or coetaneous with the leaves. Fruit smooth or rarely pilose, with succulent flesh; stone smooth or slightly rugose, ridged on the ventral suture. Leaves conduplicate in vernation.

PADUS. Flowers in slender terminal racemes, on lateral leafy or leafless branches of the year. Fruit subglobose, smooth, with succulent flesh; stone turgid, ovate or obovate, thick-margined on the ventral suture. Leaves conduplicate in vernation.

LAUROCERASUS. Flowers in racemes from the axils of the leaves of the previous year. Fruit smooth or rarely covered with a waxy bloom; flesh usually thin and subsucculent; stone smooth, rugose, or conspicuously reticulate-veined, obscurely margined on the ventral suture. Leaves conduplicate in vernation.

[1] Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxix. 74 (*Mél. Biol.* xi. 657). — Franchet, *Pl. David.* i. 103; *Pl. Delavayanæ*, i. 194.

[2] Boissier, *Fl. Orient.* ii. 640. — Aitchison, *Jour. Linn. Soc.* xviii. 50. — Franchet, *Pl. du Turkestan*, 57.

[3] Nyman, *Conspect. Fl. Europ.* 212.

[4] Torrey & Gray, *Fl. N. Am.* i. 406. — Chapman, *Fl.* 119. — Brewer & Watson, *Bot. Cal.* i. 166. — Watson & Coulter, *Gray's Man.* ed. 6, 151. — Coulter, *Contrib. U. S. Nat. Herb.* i. 102 (*Man. Pl. W. Texas*).

[5] Humboldt, Bonpland & Kunth, *Nov. Gen. et Spec.* vi. 241, 243, t. 563, 564. — Kunth, *Syn. Pl. Æquin.* iii. 480. — Grisebach, *Fl. Brit. W. Ind.* 231. — Hooker f. *Martius Fl. Brasil.* xiv. pt. ii. 55. — Hemsley, *Bot. Biol. Am. Cent.* i. 367.

[6] Miquel, *Fl. Ind. Bat.* i. pt. i. 363. — Brandis, *Forest Fl. Brit. Ind.* 190. — Hooker f. *Fl. Brit. Ind.* ii. 312.

[7] Of the sections of the genus, Amygdalus is confined to eastern Asia, which is believed to be the home of the tree from which the cultivated Peach (*Prunus Persica*, Bentham & Hooker, *Gen.* i. 609) has been derived (A. de Candolle, *Origine des Plantes Cultivées*, 176. — Bretschneider, *On the Study and Value of Chinese Botanical Works*, 10), and to southeastern Asia, where many species are found, particularly in Persia, Arabia, the Transcaucasian provinces, and Turkestan. *Prunus Amygdalus*, the origin of the cultivated Almond, was believed by Boissier (*Fl. Orient.* ii. 642) to grow on the Anti-Lebanon, in Turkestan and Mesopotamia, and on some of the mountain ranges of Persia. By cultivation this tree has spread through the Mediterranean basin, and now grows spontaneously in many of the southern countries of Europe and in northern Africa, where perhaps it is really indigenous (Cosson, *Ann. Sci. Nat.* xix. 429. — A. de Candolle, *Géographie Botanique*, ii. 887).

Emplectocladus is confined to the dry interior regions of Pacific North America, where two small shrubby species are recognized (Gray, *Proc. Am. Acad.* x. 70).

Armeniaca is Asiatic; two species are now recognized. *Prunus Armeniaca*, Linnæus (*Spec.* 474), the Apricot, is probably a native of northern China and Mongolia, whence it was carried into northern India, Persia, Armenia, and other countries of southwestern Asia, where it has long been naturalized (A. de Candolle, *Origine des Plantes Cultivées*, 171). The second species, *Prunus Mume* (Siebold & Zuccarini, *Fl. Jap.* i. 29, t. 11), is a native of Japan.

Prunus, the true Plum, of which about twenty species are distinguished, is generally distributed in the temperate regions of North America and eastern and western Asia. The native country of *Prunus domestica*, Linnæus (*Spec.* 475), the original of many of the races of the cultivated Plums of the Old World and the most important species of this section of the genus, is still undetermined. Many authors believe that it is a native of Anatolia and northern Persia, and that it was brought into Europe, where it is now widely naturalized, not more than two thousand years ago (A. de Candolle, *l. c.*). It has been cultivated in northern China and Japan from immemorial times, and now grows spontaneously on the mountains near Pekin and on those of Shensi and Kansuh (Bretschneider, *Early European Researches into the Flora of China*, 149. — Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 218).

Cerasus belongs to the cold and temperate parts of North America, Europe, and Asia; nearly forty species are now recognized, of which a larger number grow in China and Japan than in any other geographico-botanical region. The two most important species are *Prunus Avium*, Linnæus (*Fl. Svec.* ed. 2, 165), and *Prunus Cerasus*, Linnæus (*Spec.* 474), from which are derived the two races of garden Cherries (A. de Candolle, *l. c.* 163). The former, believed to be a native of the region bordering on the Caspian, has become naturalized and now grows spontaneously in southern Europe as far north at least as central France. The latter inhabits the forests of northern Persia, Armenia, and the Caucasus; it grows in Algiers, and in Europe is distributed through southern Russia and the mountainous regions of Greece, Italy, and Spain to Scandinavia; it has become naturalized in northern India (Hooker f. *Fl. Brit. Ind.* ii. 313) and Madeira (Lowe, *Man. Fl. Mad.* 235), and occasionally in the eastern part of the United States (Darlington, *Fl. Cestr.* ed. 3, 73).

Padus, with twelve or fourteen species, occurs in the temperate and subtemperate regions of the two hemispheres, with its centre of distribution in China and Japan. The type of this section, *Prunus Padus*, Linnæus (*Spec.* 473), is the most widely distributed of the genus, growing naturally in nearly every part of northern and central Europe, and through Siberia, Manchuria, northern China, Mongolia, and northern India.

Laurocerasus, with about twenty species, is the most generally distributed group of the genus. The largest number of the species occur in the Indian Archipelago and in tropical America; the

Few genera of plants are more useful to man. Many of the species contain in the seeds and leaves considerable quantities of hydrocyanic acid, to which is due their peculiar odor.[1] Some bear delicious fruits, which, fresh and dried, are important articles of human food, and others, especially the Almond, produce valuable seeds.[2] The dried fruit of the Old World Plum has laxative

others are found in southern China, Japan, India, and the Caucasian provinces, in southwestern Europe and the north Atlantic African islands, and in the southern part of the United States, California, and Mexico.

[1] Baillon, *Hist. Pl.* i. 453. — Le Maout & Decaisne, *Traité Gén. Bot.* English ed. 388. The leaves and young branches of some species of Laurocerasus at the period of active vegetation contain such quantities of hydrocyanic acid as to be dangerous to animals browsing on them. A city ordinance of Mobile prohibits throwing the trimmings of *Prunus Caroliniana*, a favorite hedge plant in that city, into the streets where they might be eaten by cattle.

[2] More than three hundred varieties of plums are now recognized in the collections of Europe, where this tree has been cultivated from the time of the ancients. The origin of the different races of the cultivated Old World Plums is obscure; they are now generally supposed to have been derived from the crossing of different species, particularly *Prunus domestica* and *Prunus insititia*, Linnæus (*Spec.* ed. 2, i. 680), or of the different varieties of the former which many authorities have considered species (Lucas, *Einleitung in das Studium der Pomologie*, Introduction. — Decaisne, *Le Jardin Fruitier*, viii. *Prunier*, 11). The cultivation of the Plum on a large scale is principally confined to the valley of the Loire and to the department of Lot-et-Garonne in France, to central Germany, and to Bosnia, Servia, Croatia, and California. In the valley of the Loire, which is one of the great sources of supply of the ordinary prunes of commerce, the variety principally grown is the Prunier de St. Julien (*Prunus domestica*, var. *Juliana*, De Candolle, *Prodr.* ii. 534). The best French prunes are produced in the regions lying about the town of Clariac in the valley of the Lot, from a variety known as Prunier d'Ente, which has been grown for at least a century in this region, where the cultivation of the trees and the harvesting and drying of the fruit is managed with the greatest care and skill. (For accounts of the production of prunes in France, see *U. S. Consular Reports*, Sept. 1888, 444. — *Kew Bull. Miscellaneous Information*, Dec. 1890, 263.) The German prunes are principally the product of a tree considered by De Candolle to be a variety of *Prunus domestica* (var. *Pruneauliana*, *l. c.* 534), and by Koch (*Dendr.* i. 94) a species, *Prunus œconomica* of Borkhausen (*Handb. Forstbot.* ii. 1401).

The Possavina district of northern Bosnia is now the most important prune-producing region of southeastern Europe, the best fruit being grown on the sides of the hills descending into the plains of Possavina. The methods of cultivating and drying the fruit are rude and primitive, and the product is inferior to the best French and German prunes. The prunes grown in Bosnia and Servia are, however, largely exported to the United States, Germany, and Hungary (Spons, *Encyclopædia of the Industrial Arts, Manufactures, and Raw Commercial Products*, i. 1027. — *Kew Bull. Miscellaneous Information*, *l. c.* 264).

The Apricot, which has been cultivated in Europe since the beginning of the Christian era, is now grown in most temperate countries, especially in France, Italy, southern Germany, India, and California; in some parts of India, where it flourishes in all the Himalayan region, as well as in Thibet and Afghanistan, the Apricot-trees constitute the chief wealth of the inhabitants, the dried fruit being an important article of trade (Jacquemont, *Voyage*, ii. 211, 434. — Brandis, *Forest Fl. Brit. Ind.* 191. — Hooker f. *Fl. Brit. Ind.* ii. 313. — Balfour, *Cyclopædia of India*, ed. 3, iii. 299). The Apricot is commonly cultivated in northern China, where the seeds are used in the place of almonds (Bretschneider, *On the Study and Value of Chinese Botanical Works*, 10; *Early European Researches into the Flora of China*, 149. — Franchet, *Pl. David.* i. 104). In Japan the Apricot is occasionally cultivated, although the climate does not appear to suit it. The Japanese species, *Prunus Mume*, produces a small hard sour fruit which is sometimes eaten salted or dried, and is made into vinegar (Rein, *Japan nach Reisen und Studien im Auftrage der Königlich Preussischen Regierung*, ii. 102).

The Almond is the most important plant of the genus. Bitter and sweet almonds are produced from trees which botanists regard as varieties of one species, and which have been cultivated in the Orient from very early times. (M. Porcius Cato, *De Re Rustica*, cap. 8. — Harris, *Nat. Hist. Bible*, 6.) In the beginning of the fourteenth century almonds had become an important article of commerce in Venice, and their consumption in mediæval Europe was enormous. Sweet almonds are produced in great quantities in Italy, Portugal, the Canary Islands, and the countries which surround the Gulf of Persia (Spons, *l. c.* i. 1022), and in California, where the cultivation of the Almond has recently assumed importance (Wickson, *The California Fruits and How to Grow Them*, ed. 2, 512. — C. H. Shinn, *Garden and Forest*, iv. 495); the best are now raised in Spain, and are known as the Jordan almonds. Bitter almonds are grown principally in the regions bordering on the Mediterranean, the best being produced in France and Sicily.

The chief value of the Almond is in the oil which is pressed from the seeds; it is of two kinds, a fixed or fatty oil, and a volatile oil. The first is obtained from the fresh fruit of the bitter and of the sweet almond, and is manufactured in southern France, Italy, and Spain, the best quality being made in Majorca. The bitter almonds are first peeled in order to free them of the essential or volatile oil, and are then crushed; the sweet almonds are crushed without peeling, and the oil is then pressed from the crushed seeds. It is of a clear yellow color and possesses an agreeable flavor, and is principally used by perfumers and, purified of its hydrocyanic acid, in medicine (Flückiger & Hanbury, *Pharmacographia*, 216, 219. — Spons, *l. c.* ii. 1377, 1416).

The Peach has been cultivated in northern China from time immemorial; it is also commonly grown in Mongolia and Cochin China (Loureiro, *Fl. Cochin.* 315), in Japan, where it is the most abundant of the stone-fruits (Rein, *l. c.* 101), in northern India, and in central and western Europe, where it appears to have been brought from Persia at the beginning of the Christian era (Brandis, *Forest Fl. Brit. Ind.* 191. — Balfour, *l. c.* 166). It flourishes in the southern and central portions of North America; and in some parts of the middle Atlantic and Pacific states the cultivation of the Peach is an important agricultural industry (Wickson, *l. c.* 293).

The Cherry, as a cultivated fruit-tree, has been known in Europe for at least two centuries, and innumerable varieties have been raised there and in the United States. These are of two races, the Bigarreau and Heart Cherries, with large, sweet, or slightly bitter fruit, derived from *Prunus Avium*, and the Morello and Duke Cherries, with smaller and often astringent fruit, derived from

properties; and the bark of many species is bitter and astringent and has been used, particularly that of the North American *Prunus Virginiana* and *Prunus serotina* and of the Old World *Prunus Padus*,[1] in medicine.[2] The aromatic leaves of the Caucasian *Prunus Laurocerasus*[3] generate by distillation a volatile oil, and are used in making Cherry-cordial water.[4] The flowers of the Peach are sometimes used in Europe and the United States as a mild purgative;[5] in China they are considered laxative and sedative and serve as a vermifuge; in the same country the seeds are employed in the treatment of many diseases, and vinegar was formerly made from the pulp.[6] The flowers of the Blackthorn or Sloe, *Prunus spinosa*,[7] are purgative, and the fruit, which is astringent and austere until mellowed by frost, is sometimes used in medicine for its refrigerant and styptic properties.[8] The seeds of *Prunus Mahaleb*,[9] a native of the Caucasian provinces, and now naturalized in southern Europe and sparingly in some parts of eastern North America, possess an agreeable flavor; and the oil pressed from them is used in perfumery,[10] and is valued by the Arabs as a cure against calculus of the bladder.[11] Cordials or ratafias are made by steeping in spirits the fruit of Plums, Cherries, and Peaches, or the seeds of the Bitter Almond, the Cherry, and the Apricot; from the fruit of the European wild Cherry, *Prunus Avium*, kirschwasser and maraschino[12] are prepared, and from that of the European Plums, zwetschenwasser and raki.[13] A limpid oil is obtained from the seeds of various species of Prunus in Europe and India;[14] and Plum-trees, the European Cherries, the Peach, the Apricot, and the Almond secrete from their trunks and branches a gum which was once employed in medicine, and is now used in France in various industrial processes.[15]

Prunus Cerasus. The origin, however, of many of the varieties of cultivated Cherries is obscure, as species, subspecies, and varieties have crossed and recrossed in their production.

[1] Linnæus, *Spec.* 473. — Koch, *Dendr.* i. 120. — Brandis, *Forest Fl. Brit. Ind.* 194. — Hooker f. *Fl. Brit. Ind.* ii. 315. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxix. 108 (*Mél. Biol.* xi. 705). *Cerasus Padus*, De Candolle, *Fl. Franc.* ed. 3, iv. 480; *Prodr.* ii. 539. — *Nouveau Duhamel*, v. 2, t. 1. — Boissier, *Fl. Orient.* ii. 650.

[2] B. S. Barton, *Coll.* ed. 3, i. 11. — A. Richard, *Hist. Nat. Med.* ed. 3, iii. 632. — Endlicher, *Enchirid.* 663. — Rosenthal, *Syn. Pl. Diaphor.* 978. — Porcher, *Resources of Southern Fields and Forests*, 169. — Guibourt, *Hist. Drog.* ed. 7, iii. 317. — Baillon, *Hist. Pl.* i. 454. — *U. S. Dispens.* ed. 14, 749. — Stillé & Maisch, *Nat. Dispens.* ed. 2, 1177. — Flückiger & Hanbury, *Pharmacographia*, 223.

[3] Linnæus, *Spec.* 474. — Koch, *Dendr.* i. 125.

Cerasus Laurocerasus, Loiseleur, *Nouveau Duhamel*, v. 6. — De Candolle, *Prodr.* ii. 540. — Boissier, *Fl. Orient.* ii. 650.

[4] Lindley, *Fl. Med.* 232. — A. Richard, *l. c.* 632. — Rosenthal, *l. c.* — Baillon, *l. c.* 453. — Flückiger & Hanbury, *l. c.* 226. — Guibourt, *l. c.* 318, f. 678. — Jackson, *Commercial Botany of the 19th Century*, 81.

[5] Guibourt, *l. c.* 314.

[6] Smith, *Contrib. Mat. Med. China*, 168.

[7] Linnæus, *l. c.* 475. — De Candolle, *Prodr.* ii. 532. — Guimpel, Willdenow & Hayne, *Abbild. Deutsch. Holz.* i. 87, t. 66. — Koch, *Dendr.* i. 98.

[8] Linnæus, *Mat. Med.* 79. — Woodville, *Med. Bot.* ii. 233, t. 84. From the green fruit of the Sloe, a strong astringent extract, known as *acacia nostras*, was formerly made in Germany (A. Richard, *l. c.* 630).

[9] Linnæus, *Spec.* 474. — Jacquin, *Fl. Austr.* iii. 15, t. 227. — Koch, *l. c.* 116.

Cerasus Mahaleb, Loiseleur, *Nouveau Duhamel*, v. 6, t. 2. — De Candolle, *l. c.* 539.

[10] Loudon, *Arb. Brit.* ii. 708.

[11] Le Maout & Decaisne, *Traité Gén. Bot.* English ed. 388. — Guibourt, *l. c.* 316.

[12] Kirschwasser is principally produced in the valley of the Rhine in Germany, France, and Switzerland. A wild black-fruited variety of *Prunus Avium* (var. *macrocarpa*, De Candolle, *Prodr.* ii. 535) is thought to produce the best quality, which is made from carefully selected ripe fruit; this is crushed over wicker strainers that separate the pulp and stones from the juice, which is allowed to flow into large tubs; the stones are then collected and added to the juice which is fermented in tightly covered vats, and at the end of four or five days is drawn off and distilled. Kirschwasser of an inferior quality is made from cherries shaken from the trees and thrown into open hogsheads, in which the ripe, half ripe, and rotten fruit is all crushed together and allowed to ferment. At the end of twenty or thirty days, when fermentation is complete, the whole mass is distilled over an open fire. Made in this way, kirschwasser has a strong and disagreeable flavor, due to the mould developed during the process of fermentation.

Maraschino is made from the Marasca Cherry, a variety of *Prunus Avium* with small acid fruit (*Nouveau Duhamel*, v. 21), by a process similar to that by which kirschwasser is prepared, except that honey or sugar is added to the liquor after it is distilled. Maraschino is principally manufactured in Dalmatia, that made in the neighborhood of Zara being considered the best (Loudon, *l. c.* 697. — Spons, *Encyclopædia of the Industrial Arts, Manufactures, and Raw Commercial Products*, i. 224).

[13] Loudon, *l. c.* 690.

[14] Le Maout & Decaisne, *l. c.* 388.

In India, oil pressed from the seeds of the Apricot and the Peach is used for illuminating, in cookery, and on the human hair (Brandis, *l. c.* 192. — Balfour, *Cyclopædia of India*, ed. 3, iii. 166). Cherry-oil is now manufactured in England from the seeds of *Prunus serotina*, imported from the United States (Spons, *l. c.*).

[15] See Trécul, *Maladie de la gomme chez les Cerisiers, les Pruniers, les Abricotiers, et les Amandiers, Compt. Rend. Acad. Sci.* li. 624; *Produit de la gomme chez le Cerisier, le Prunier, l'Amandier, l'Abricotier et le Pêcher, Mém. Inst.* xxx. 241.

The gum which exudes from the bark of Prunus, known generally as Cherry-gum, is only partially soluble in water, with which it

The wood of Prunus is close-grained, solid, and durable, and is usually light brown, more or less tinged with red. The most valuable timber tree of the genus is the North American *Prunus serotina*. The wood of *Prunus domestica* and of *Prunus Avium* is much esteemed in Europe by makers of furniture and musical instruments, and by turners.[1] The wood of *Prunus Mahaleb* is hard, dark-colored, and fragrant; known in France as bois de St. Lucie, it is valued by cabinet-makers, and is employed in the manufacture of tobacco pipes and of many small articles.[2] The spiny stems of *Prunus spinosa* are used for canes, and for the handles of agricultural implements and other tools.[3] In India the wood of the Peach-tree is utilized in building, and that of the Apricot for many domestic purposes;[4] and in Japan the wood of *Prunus Pseudo-Cerasus*[5] and of *Prunus Mume* for engraving and for the blocks used in printing cloth and wall-paper.[6]

Prunus contains many plants valued in gardens for the beauty of their flowers and foliage. Various forms of the Cherry, the Peach, and the Plum, with double flowers, or of abnormal habit, have long been cultivated. The parks and gardens of temperate Europe are enlivened by the evergreen foliage of *Prunus Laurocerasus*, the so-called English Laurel, a native of the Orient, and of *Prunus Lusitanica*,[7] the Portugal Laurel, which are replaced in those of the southern part of the United States by *Prunus Caroliniana;* in Japan *Prunus Mume* and *Prunus Pseudo-Cerasus* hold the first place among flowering plants in the affections of the people, and no Japanese home is without them. The first, when its leafless branches are covered with white or red flowers, announces the arrival of spring and a time of rejoicing, while the blossoms of the second invite the people to another festival.[8]

Numerous insects[9] prey upon the different species of Prunus, which are also subject to serious fungal diseases.[10]

makes a thick mucilage, the insoluble portion, to which the name of *Cerisin* is given, merely swelling in water. It is brittle, with an insipid, sweet, or astringent flavor, and is at first liquid and colorless, but with exposure to the air hardens and grows darker; in commerce Cherry-gum appears in the form of large, irregular shaped pieces, and is lustrous and transparent, varying in color from pale yellow to brown, that produced by the Cherry-tree being of a darker color than the gum of the Plum-tree. *Cerisin* is colorless, transparent, odorless, and tasteless (Henry Watts, *Dictionary of Chemistry.* — Spons, *Encyclopædia of the Industrial Arts, Manufactures, and Raw Commercial Products*, ii. 1638. — Guibourt, *Hist. Drog.* ed. 7, iii. 318).

[1] Loudon, *Arb. Brit.* ii. 698. — Matthieu, *Fl. Forestière*, ed. 3, 125, 129.

[2] Loudon, *l. c.* 708. — Brandis, *Forest Fl. Brit. Ind.* 195. — Matthieu, *l. c.* 127.

[3] The common Blackthorn canes of northern Europe are cut from the stems of *Prunus spinosa.* — Loudon, *l. c.* 686. — Matthieu, *l. c.* 130.

[4] Brandis, *l. c.* 191.

[5] Lindley, *Trans. Hort. Soc. Lond.* vi. 90.

[6] Rein, *Japan nach Reisen und Studien im Auftrage der Königlich Preussischen Regierung*, 297.

[7] Linnæus, *Spec.* 473. — Koch, *Dendr.* i. 124.

Cerasus Lusitanica, Loiseleur, *Nouveau Duhamel*, v. 5. — Lowe, *Fl. Mad.* 236.

[8] Rein, *l. c.* 319. — Conder, *The Flowers of Japan and the Art of Floral Arrangement.*

[9] The North American species of Prunus furnish food to a large number of insects, some of which have become injurious to the cultivated fruit-trees of this genus. The original food-plant of the Peach-tree Borer (*Ægeria exitiosa*, Say) is believed to have been *Prunus serotina*, which is sometimes attacked by this insect; and a number of beetles are known as borers in the wood of the different species. *Dicerca divaricata* (Say) attacks the trunks of the Wild Cherry, and the Flat-headed Apple-tree Borer (*Chrysobothris femorata*, Fabricius) those of the Wild Plum; and another borer, *Cyrtophorus verrucosus*, Olivier, is found in the wood of *Prunus serotina*, and of *Prunus Pennsylvanica.*

The number of insects which prey upon the foliage of Prunus is very large. Packard (*5th Rep. U. S. Entomolog. Comm.* 1886–1890) records sixty-eight species as feeding on the Wild Plums and the Wild Cherries of eastern America; but this list probably represents only a small proportion of the insects which feed on the foliage of trees of this genus in North America, as little is known of those that attack the western and southern species. The Tent-caterpillars (Clisiocampa), are particularly partial to the native Plums and Cherries, and in those parts of the country where these trees are plentiful, they are considered a menace to neighboring orchards by their harboring these pests. The Canker-worms and the Fall Web-worms also feed on the trees of this genus. Larvæ of *Platysamia Cecropia* (Linnæus) and other large moths of the Silk-worm family are found on the Plum and the Cherry; and the caterpillars of *Sphinx drupiferarum*, Abbot & Smith, occasionally defoliate their branches (Saunders, *Insects Injurious to Fruits*, 162). The leaves also are affected by several species of leaf-moths.

The Cherry-slug (*Selandia Cerasi*, Peck) and one or two other Saw-flies feed on the Wild Cherry. A small Curculio (*Anthonomus quadrigibbus*, Say) is often abundant in the seeds of *Prunus serotina.* The fruit of the Wild Plum is destroyed by the Plum-curculio (*Conotrachelus Nenuphar*, [Herbst]), whose ravages seriously interfere with the cultivation in the United States of the European and native plums.

The Plum-tree has been found to be the food-plant of the Hop-aphis (*Phorodon Humuli*, Schrank) during certain periods of the year, and the destruction of Plum-trees in the vicinity of Hop-fields is recommended by C. V. Riley (*Insect Life*, i. 133).

[10] The number of described species of fungi which infest arbores-

Prunus, the classical name of the Plum-tree, was adopted by Linnæus for a section of the genus as now extended.

cent *Rosaceæ* is very great, and as the fruit-trees of the temperate zones belong to this family, they have been more carefully studied than those affecting any other family, with the exception of *Vitaceæ*. Of the fungi which attack the North American species of Prunus, one of the most striking is *Plowrightia morbosa*, Saccardo (*Sphæria morbosa*, Schweinitz), which produces the warty excrescences known as Black Knot. These were formerly supposed to be due to the attacks of insects, but their fungal nature is now known (Farlow, *Bull. Bussey Inst.* i. 440, t. 4, 5, 6). *Plowrightia morbosa* is peculiar to North America, and is found on *Prunus Americana*, *Prunus nigra*, *Prunus hortulana*, *Prunus angustifolia*, *Prunus maritima*, *Prunus subcordata*, *Prunus Pennsylvanica*, *Prunus serotina*, and *Prunus Virginiana*. The ugly black knots which often cover the branches of these plants are familiar; there are two forms of fructification, one called the conidial stage found in early summer when the surface of the knots is dark green, and the other ripening in midwinter or early spring when the knots begin to break up. Horticulturally considered, the Black Knot is a serious pest, as it passes from our native species of Prunus to the cultivated Plums and Cherries of Old World origin. The cultivation of Plums has been abandoned in some of the eastern states, owing to the ravages of this fungus; and in some parts of the country, varieties of cultivated Cherries are also badly diseased. The disease has been known for many years in the eastern states, but has not developed on the cultivated Plums and Cherries of California, although, as the fungus is endemic on the native species of the Pacific coast, it may be expected to spread sooner or later to the fruit-growing regions of the coast. In Europe no native disease corresponds to Black Knot, which has not yet been imported from America.

Next in seriousness among the diseases which affect our species of Prunus are the prominent deformities caused by species of Taphrina, which produce Leaf-curl. The most striking of these is *Taphrina deformans*, Tulasne, which causes the leaves of Peach-trees to become thickened, curled, and wrinkled, doing, however, less real injury than the disease called The Yellows, the origin of which is not yet satisfactorily determined. The plant which by some authorities is considered a variety of *Taphrina deformans* (var. *Wiesneri*, Rathay) is occasionally seen on *Prunus serotina*, although the exact determination of the species is not beyond question. A similar disease, *Taphrina Pruni*, Tulasne, causes the distortion known as Plum-pockets on cultivated Plums, and on the fruits of our native *Prunus serotina* and *Prunus maritima*, and of a few other species. The pockets are best seen in the cultivated Plums, which are attacked in early summer soon after the fruit sets; the young ovaries swell, often almost to the size of full-grown plums, by the latter part of June, when they are hollow with the exception of a few fibrous bands, and are white and powdery. Similar, although smaller, pockets are sometimes found on wild Plum-trees, and it is probable that the disease is a native of America as well as of Europe, where it is common. It should not be confounded with *Monilia fructigena*, Persoon, a mould-like fungus which attacks cherries, plums, and peaches as they ripen, covering them with a grayish powder without, however, causing them to become hollow.

The leaves of the different species of Prunus are attacked by a number of small fungi, some of which are destructive. The Rust, *Puccinia Pruni-spinosæ*, Persoon, causes small yellow or brownish yellow spots to appear on the under surface, with accompanying purplish-red spots on the upper surface, of the leaves of *Prunus serotina*, *Prunus Virginiana*, and other species, as well as on those of the Peach and the Almond. In the southern states, especially, this Rust is common on Peach-trees, and is often accompanied by a thin white mould (*Cercosporella Persica*, Saccardo).

The Mildew, *Podosphæra Oxyacanthæ*, De Bary, is widely distributed in Europe and America on wild and cultivated species of Prunus, as well as on various species of *Pomeæ*. Other fungi which attack North American species of Prunus are *Septoria cerasina*, Berkeley & Ravenel, which forms destructive small black spots on the leaves; *Monilia Linhartiana*, Magnus, which covers the leaves of *Prunus Virginiana* with a web-like mould, causing them to dry and fall; the curious *Cornularia Persicæ*, Saccardo, which forms small black club-shaped bunches on the bark of Peach-trees; and the cinnabar-colored Punk-fungus, *Polyporus cinnabarinus*, Fries, common on the native Wild Cherries used for fencing.

CONSPECTUS OF THE NORTH AMERICAN ARBORESCENT SPECIES.

PRUNUS. Flowers in fascicled umbels; fruit often slightly two-lobed by a ventral groove; leaves conduplicate or convolute in vernation.

Leaves conduplicate in vernation.

Fruit red or orange-colored, destitute of bloom.

Calyx-lobes glandular-serrate, glabrous on the inner surface; stone compressed; leaves broadly oblong-ovate to obovate; petioles biglandular . . . . . 1. P. NIGRA.

Calyx-lobes entire, pubescent on the inner surface; stone turgid; leaves oval or slightly obovate; petioles usually eglandular . . . . . 2. P. AMERICANA.

Calyx-lobes glandular-serrate, pubescent on the two surfaces; stone turgid, compressed at the two ends; leaves ovate-lanceolate, acute; petioles glandular . 3. P. HORTULANA.

Calyx-lobes glandular-ciliate, glabrous; stone turgid; leaves lanceolate to oblong-lanceolate; petioles biglandular . . . . . 4. P. ANGUSTIFOLIA

Fruit blue, covered with a glaucous bloom.

Calyx-lobes entire, puberulous on the outer, tomentose on the inner surface; stone turgid, acute at the two ends; leaves lanceolate to oblong-ovate; petioles eglandular . . . . . 5. P. ALLEGHANIENSIS.

Leaves convolute in vernation.

Fruit red or yellow, nearly destitute of bloom.

Calyx-lobes pubescent or puberulous, with ciliate margins; stone flattened or turgid, pointed at the two ends; leaves broadly ovate to orbicular; petioles eglandular . . . . . 6. P. SUBCORDATA.

Fruit dark blue or black, covered with a glaucous bloom.

Calyx-lobes entire, glabrous or puberulous on the outer, tomentose on the inner surface; stone slightly compressed, acute at the two ends; leaves ovate-lanceolate to oblong; petioles eglandular . . . . . 7. P. UMBELLATA.

CERASUS. Flowers fascicled or corymbose; fruit globular; leaves conduplicate in vernation.

Calyx-lobes obtuse, entire; stone oblong-globular; leaves oblong-lanceolate; petioles glandular . . . . . 8. P. PENNSYLVANICA.

Calyx-lobes rounded or sometimes emarginate at the apex; stone ovoid, acute at the two ends; leaves oblong-obovate to oblanceolate . . . . . 9. P. EMARGINATA.

PADUS. Flowers racemose on leafy branches of the year; fruit globular; stone cylindrical; leaves conduplicate in vernation.

Calyx-lobes deciduous; stone oblong-ovate; pointed at the apex; leaves broadly oval or oblong-obovate, usually abruptly acuminate . . . . . 10. P. VIRGINIANA.

Calyx-lobes persistent on the ripe fruit; stone oblong-obovate; leaves oblong or lanceolate-oblong, usually gradually acuminate . . . . . 11. P. SEROTINA.

LAUROCERASUS. Flowers racemose, from the axils of persistent leaves of the previous year; fruit globose or slightly two-lobed; leaves conduplicate in vernation.

Calyx-lobes rounded, with undulate margins; stone broadly ovate, cylindrical; leaves oblong-lanceolate, entire, or rarely remotely spinulose-serrate . . . . 12. P. CAROLINIANA.

Calyx-lobes acute, with laciniate margins; stone depressed-globose; leaves elliptical to oblong-ovate, entire . . . . . 13. P. SPHÆROCARPA.

Calyx-lobes acute, entire; stone ovate, slightly compressed; leaves ovate to lanceolate-acuminate, coarsely spinulose-toothed or rarely entire . . . . . 14. P. ILICIFOLIA.

PRUNUS NIGRA.

Red Plum. Canada Plum.

CALYX-LOBES glandular-serrate, glabrous on the inner surface. Stone compressed. Leaves broadly oblong-ovate to obovate; petioles biglandular.

Prunus nigra, Aiton, *Hort. Kew.* ii. 165. — Willdenow, *Spec.* ii. pt. ii. 993; *Enum.* 518; *Berl. Baumz.* ed. 2, 311. — Poiret, *Lam. Dict.* v. 674. — Persoon, *Syn.* ii. 35. — *Bot. Mag.* t. 1117. — Pursh, *Fl. Am. Sept.* i. 331. — Torrey, *Fl. U. S.* 469. — Sprengel, *Syst.* ii. 477. — Spach, *Hist. Vég.* i. 399. — Roemer, *Fam. Nat. Syn.* iii. 59.

Cerasus nigra, Loiseleur, *Nouveau Duhamel*, v. 32. — De Candolle, *Prodr.* ii. 538. — Hooker, *Fl. Bor.-Am.* i. 167. — Don, *Gen. Syst.* ii. 513. — Loudon, *Arb. Brit.* ii. 704 (in part), f. 411, 412.

Prunus mollis, Torrey, *Fl. U. S.* 470.

Prunus Americana, Torrey & Gray, *Fl. N. Am.* i. 407 (in part). — Nuttall, *Sylva*, ii. 19 (in part). — Torrey, *Fl. N. Y.* i. 194 (in part). — Provancher, *Flore Canadienne*, i. 162. — Koch, *Dendr.* i. 101 (in part). — Emerson, *Trees Mass.* ed. 2, ii. 511. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. '65 (in part). — Watson & Coulter, *Gray's Man.* ed. 6, 151 (in part). — Gray, *Forest Trees N. Am.* t. 46.

A small tree, twenty or thirty feet in height, with a trunk sometimes five or six inches in diameter, dividing, usually five or six feet from the ground, into a number of stout upright branches, which form a narrow rigid head. The bark of the trunk is an eighth of an inch thick, and light gray-brown, with a smooth outer layer which exfoliates in large thick plates composed of several papery coats, and in falling exposes a darker slightly fissured scaly inner bark. The branches in their second year develop stout spiny lateral spur-like secondary branchlets, which are sometimes two inches in length and grow into leafy branches. The branchlets, when they first appear, are bright green, glabrous or puberulous; they are slightly zigzag and marked by numerous pale excrescences, and in their second year are dark brown tinged with red. The winter-buds are acuminate, an eighth to a quarter of an inch in length, and covered with chestnut-brown triangular scales with broad pale scarious margins. The leaves are oblong-ovate or obovate, abruptly contracted at the apex into long narrow points, wedge-shaped, truncate, or slightly heart-shaped at the base, and doubly crenulate-serrate with small dark glandular teeth; when they unfold they are faintly tinged with red, and are pubescent on the under surface, or are glabrous with the exception of conspicuous tufts of slender white or rufous hairs in the axils of the primary veins; at maturity they are membranaceous, rather opaque, light green on the upper, and pale on the lower surface, three to five inches long and one and a half to three inches broad, with conspicuous pale midribs and slender veins, and are borne on stout petioles from half an inch to an inch in length, and furnished near the apex with two large dark glands. The stipules are lanceolate or, on vigorous shoots, often three to five-lobed, glandular-serrate, half an inch in length, and early deciduous. The flowers, which are an inch and a quarter across when expanded, appear before the leaves, from the first of May in eastern New England to the end of the month at the north; they are proterandrous, and are produced in three or four-flowered umbels, with short thick peduncles conspicuously marked by the scars left by the falling of the bud-scales, which when fully grown are one third of an inch long, pale green tinged with pink, and usually persistent until the expansion of the flowers. These are borne on slender glabrous dark red pedicels which vary from one half to two thirds of an inch in length. The calyx-tube is broadly obconic, dark red on the outer, and bright red on the inner surface, with narrow acute glandular lobes, glabrous or occasionally pubescent on the outer surface, and reflexed after anthesis. The petals, which are white, turn pink in fading, and are broadly ovate, rounded at the apex, with more or less erose margins, and contracted at the base into short claws.

The fruit, which ripens between the middle and the end of August, is oblong-oval, and an inch to an inch and a quarter long, with a tough thick orange-red skin nearly destitute of bloom, and yellow rather austere flesh adhesive to the stone, which is nearly oval, compressed, an inch in length, two thirds of an inch in breadth, thick-walled, and acutely ridged along the ventral, and slightly grooved on the dorsal suture. The seed is ovate and compressed, with a thin brown testa and a short exserted radicle.

Prunus nigra is distributed from Newfoundland[1] through the valley of the St. Lawrence, and westward to the valleys of the Rainy and Assiniboine Rivers and the southern shores of Lake Manitoba.[2] It is found in the neighborhood of streams in rich alluvial soil, or grows on low limestone hills in open glades with Hawthorns and Viburnums, or along the borders of the forest.[3]

The wood of *Prunus nigra* is heavy, hard, strong, and close-grained; it is rich bright red-brown, with a lustrous surface and thin lighter colored sapwood, and contains many thin medullary rays. The specific gravity of the absolutely dry wood is 0.6918, a cubic foot weighing 43.17 pounds.

Jacques Cartier, on his second voyage to North America, landed in September, 1535, on the banks of the St. Lawrence, near the island of Orleans, which he named Isle de Bacchus, on account of the wild grapes which he found growing in the woods, and was there the first European to see the Canada Plum-tree;[4] its dried fruit he had already seen in the canoes of a tribe of Indians whom he had met during the previous season in the Bay of Chaleur.[5]

Prunus nigra was introduced into English gardens in 1773[6] by Lee & Kennedy,[7] nurserymen at Hammersmith near London; and the earliest botanical description was drawn up from the cultivated tree.

Prunus nigra is often planted in Canadian gardens, and occasionally in those of the northern states, for its fruit or for the beauty of its large slightly fragrant flowers.[8]

[1] Teste Hooker, *Fl. Bor.-Am.* i. 167.

[2] Richardson, *Arctic Searching Exped.* ii. 288. — Brunet, *Cat. Vég. Lig. Can.* 20. — Bell, *Rep. Geolog. Surv. Can.* 1867–69, Appendix, 8 (*Pl. Manitoulin Islands*); 1879–80, 54ᶜ. — Macoun, *Cat. Can. Pl.* i. 124.

The range of the Canada Plum has been much extended through cultivation, and it is now naturalized and grows spontaneously in the neighborhood of houses and along the borders of highways in northern New England and New York in the territory adjacent to the Canadian boundary, and in eastern Massachusetts. It is to be looked for growing indigenously in northern Minnesota, and is probably naturalized in Wisconsin and Iowa, and some of the varieties of cultivated Plum-trees which are believed to have been taken from the woods of these states can be traced to this species.

[3] Prof. D. P. Penhallow notices that the leaves of *Prunus nigra*, when it grows on limestone hills in the Province of Quebec, are pubescent on the lower surface, and that they are glabrous or puberulous when it grows on bottom-lands. *Prunus Americana* under similar conditions shows the same variations in the valley of the Mississippi River.

[4] "Pleine de moult beaux arbres de la nature et sorte de France: comme chesnes, ormes, fresnes, noyers, pruniers, ifs, cedres, vignes, aubépines qui portent fruit aussi gros que prunes de damas, et autres arbres." (*Voyages de Decouverte au Canada*, 2ᵐᵉ Voyage, 34 [Literary and Historical Society of Quebec. Reprint].)

[5] "Ils ont aussi des prunes qu'ils sèchent comme nous faisons pour l'hiver, et les appellent Honesta." (*Idem.* 1ᵉʳ Voyage, 17. See also Hakluyt, *Voyages*, ed. Evans, iii. 258.)

[6] Aiton, *Hort. Kew.* ii. 165.

[7] James Lee (1715–1795); a native of Selkirk, Scotland, was employed in the gardens of Syon House, a seat of the Duke of Northumberland, and afterwards in those of the Duke of Argyll at Whitton; in 1760, in partnership with Louis Kennedy, he established a nursery at Hammersmith, which soon became famous and for many years was considered the most important in the world. Lee was a correspondent of Linnæus, who dedicated to him a genus of Old World tropical plants related to the Grape Vine (*Leea*); he was the author of an *Introduction to Botany*, arranged according to the Linnæan system, which passed through several editions and was long held in high repute, and in 1774 he published a catalogue of the plants and seeds grown in his garden.

Louis Kennedy (1775–1818) made many contributions to horticultural literature toward the end of the last century, and articles from his pen are found in the *Botanical Repository* (1799–1804). *Kennedya*, a genus of Australian leguminous plants, well known in gardens, was dedicated to him by the French botanist Ventenat.

Lee & Kennedy were exceedingly active and successful in introducing new plants, and maintained collectors in North and South America, and, in partnership with the empress Josephine, one in South Africa also. They first cultivated in England several North American plants, as well as the China Rose and *Fuchsia coccinea*, which was the first of its genus introduced into gardens.

[8] The fruit of *Prunus nigra* is sold in large quantities in Canadian markets; it is eaten raw or cooked, and is made into preserves and jellies. Like the fruit of all Plum-trees, it varies in size and shape, in the thickness and color of the skin, and in the flavor and juiciness of the flesh; and some attention has been paid in Canada to selecting the best wild varieties for cultivation. Varieties of this species are propagated and sold by nurserymen in some of the western states, and to it can be referred the well known Purple Yosemite, Quaker, and Weaver Plums.

EXPLANATION OF THE PLATE.

Plate CXLIX. Prunus nigra.

1. A flowering branch, natural size.
2. Diagram of a flower.
3. Vertical section of a flower, enlarged.
4. A pistil, with a vertical section of the ovary removed, enlarged.
5. Cross section of an ovary, enlarged.
6. An ovule, much magnified.
7. A fruiting branch, natural size.
8. Cross section of a fruit, natural size.
9. Vertical section of a fruit, natural size.
10. A stone, natural size.
11. A seed, natural size.
12. An embryo, enlarged.
13. A winter branchlet, natural size.
14. Part of a leaf, with stipules, natural size.

C. E. Faxon del. *Picart fr. sc.*

PRUNUS NIGRA, Ait.

A. Riocreux direx.t *Imp. R. Taneur, Paris.*

PRUNUS AMERICANA.

Wild Plum.

CALYX-LOBES entire, pubescent on the inner surface. Stone turgid. Leaves oval or slightly obovate; petioles mostly eglandular.

Prunus Americana, Marshall, *Arbust. Am.* 111. — Darlington, *Ann. Lyc. N. Y.* iii. 87, t. 1; *Fl. Cestr.* ed. 3, 72. — Torrey & Gray, *Fl. N. Am.* i. 407 (in part). — Nuttall, *Sylva*, ii. 19 (in part), t. 48. — Torrey, *Fl. N. Y.* i. 194 (in part); *Emory's Rep.* 408; *Pacific R. R. Rep.* iv. 82. — Koch, *Dendr.* i. 101 (in part). — Ridgway, *Proc. U. S. Nat. Mus.* 1882, 65. — Sargent, *Forest Trees N. Am. 10th Census U. S.* ix. 65 (in part). — Watson & Coulter, *Gray's Man.* ed. 6, 151 (in part). — Coulter, *Contrib. U. S. Nat. Herb.* ii. 102 (*Man. Pl. W. Texas*).

? **Prunus Mississippi**, Marshall, *Arbust. Am.* 112.

Prunus spinosa?, Walter, *Fl. Car.* 146 (not Linnæus).

Prunus hiemalis, Michaux, *Fl. Bor.-Am.* i. 284 (in part). — Desfontaines, *Hist. Arb.* ii. 206 (in part). — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 539. — Poiret, *Lam. Dict.* v. 679 (in part). — Persoon, *Syn.* ii. 35. — *Nouveau Duhamel*, v. 184 (in part). — Elliott, *Sk.* i. 542. — Schmidt, *Oestr. Baumz.* iv. 48, t. 231. — Spach, *Hist. Vég.* i. 398. — Roemer, *Fam. Nat. Syn.* iii. 59 (in part).

Prunus nigra, Muehlenberg, *Cat. Pl. Am. Sept.* ed. 2, 49 (not Aiton).

Cerasus hiemalis, De Candolle, *Prodr.* ii. 538 (in part). — Hooker, *Fl. Bor.-Am.* i. 168 (in part). — Don, *Gen. Syst.* ii. 514 (in part). — Loudon, *Arb. Brit.* ii. 704 (in part).

Cerasus nigra, Hooker, *Compan. Bot. Mag.* i. 24 (not Loiseleur).

Cerasus Americana, Hooker, *Compan. Bot. Mag.* i. 24.

A tree, twenty to thirty-five feet in height, with a trunk which rarely exceeds a foot in diameter and divides, usually four or five feet from the ground, into many spreading branches, often pendulous toward the extremities, which form a broad graceful head, and are furnished with long slender remote sometimes spinescent lateral spur-like branchlets. The bark of the trunk is half an inch thick and dark brown tinged with red, the outer layers separating into large thin persistent plates. The branchlets, when they first appear, are light green and glabrous or puberulous, or coated with dense pale tomentum; they are light orange-brown during their first winter, and in their second year are darker, often tinged with red, and marked with minute circular excrescences. The winter-buds are covered with chestnut-brown triangular scales with more or less erose margins; the inner scales when fully grown are foliaceous, half an inch long, oblong, acute, remotely serrate, furnished below the middle with two narrow acuminate lobes, and fall after the small colorless scales of the outer rows. The leaves are oval or slightly obovate, acuminate, narrowed and occasionally rounded at the base, sharply and often doubly serrate; when they unfold they are sometimes nearly glabrous, or are furnished on the lower surface with conspicuous tufts of pale hairs, or are pubescent or densely coated below with thick pale tomentum; at maturity they are rather coriaceous, more or less rugose, dark green on the upper, and paler on the lower surface, and glabrous or coated below with pale or rufous pubescence or tomentum; they are three or four inches long and an inch and a half broad, with slender midribs grooved on the upper side and narrow primary veins, and are borne on slender petioles one half to two thirds of an inch in length and usually destitute of glands.[1] The stipules are linear or often three-lobed, sharply serrate,

[1] The amount and character of the pubescence on the leaves and shoots of *Prunus Americana* vary considerably on different individuals and in different parts of the country; in the eastern and southern states the leaves are either glabrous or slightly pubescent on the lower surface along the midribs and primary veins; in the valley of the Mississippi the lower surface is often covered with pubescence; and from Missouri to northern Mexico, especially south of the Red River, the young branches, the lower surface of the leaves, and the petioles are coated with pale tomentum. This form which gradually passes into the smooth form of the east and of the Rocky Mountains is

Var. *mollis*, Torrey & Gray, *Fl. N. Am.* i. 407. — Sargent, *Forest Trees N. Am. 10th Census U. S.* ix. 65. — Havard, *Proc. U. S. Nat. Mus.* viii. 512. — Coulter, *Contrib. U. S. Nat. Herb.* ii. 102 (*Man. Pl. W. Texas*).

one half to three quarters of an inch long, and early deciduous. The flowers, which appear in Texas early in March, and in Pennsylvania two months later, when the leaves are half grown, are produced in two to five-flowered umbels, and are borne on slender glabrous green pedicels which vary from one third to two thirds of an inch in length; on some individuals they are unisexual by the abortion of the pistils, and are, when expanded, an inch across and exhale a disagreeable odor. The calyx-tube is acutely obconic, light red, glabrous or puberulous, and green on the inside, with acuminate lobes, reflexed after anthesis, and slightly pubescent on the outer, and pilose on the inner surface. The petals are pure white, half an inch long and a quarter of an inch broad, rounded and irregularly laciniate at the apex, and contracted below into long narrow claws which are bright red at the base. The fruit, which ripens in June at the south, and from the end of August to early October at the north, is subglobose or rarely slightly elongated, and usually rather less than an inch in diameter; in ripening it turns from green to orange, often with a red cheek, and when fully ripe is bright red, usually destitute of bloom, and more or less conspicuously marked with pale spots; the skin is tough, thick, acerb, and easily separated from the bright yellow succulent rather juicy acid flesh which adheres to the oval stone; this is slightly rugose, pointed at the apex, more or less contracted at the base, turgid, often nearly as thick as it is broad, and slightly and acutely ridged on the ventral, and obscurely grooved on the dorsal suture.

Prunus Americana is distributed from middle and northern New Jersey[1] and central New York[2] to Nebraska,[3] the valley of the upper Missouri River in Montana,[4] the eastern slopes of the Rocky Mountains of Colorado,[5] the Chattahoochee region of western Florida, the valley of the Rio Grande in southern New Mexico, and the mountains of northeastern Mexico. In the middle and northern states it is found in rich soil, growing along the borders of streams and swamps, where it often forms thickets of considerable extent; in the southern Atlantic states it sometimes inhabits river-swamps, which are submerged during several months of each year, and west of the Mississippi River it grows on bottom-lands and sometimes on dry limestone uplands. At the north the Wild Plum-tree is rarely more than ten or fifteen feet in height, and it is in southern Arkansas and eastern Texas that it attains its greatest dimensions.

The wood of *Prunus Americana* is heavy, hard, close-grained, and strong. It has a lustrous surface and is dark rich brown tinged with red, with thin light-colored sapwood, and many medullary rays. The specific gravity of the absolutely dry wood is 0.7313, a cubic foot weighing 46.95 pounds.

The fruit is sometimes used in the preparation of jellies and preserves, and is eaten raw or cooked.[6]

Prunus Americana was first described by Humphrey Marshall, in his *Arbustum Americanum*, published in 1785; and in most subsequent works it has been confounded with *Prunus nigra* of Aiton, published four years later.[7]

As an ornamental plant *Prunus Americana* has real value; the long wand-like branches form a wide graceful head, which is handsome in winter, and in spring is covered with masses of pure white flowers, followed by ample bright foliage and abundant showy fruit.[8]

[1] Britton, *Cat. Pl. N. J.* 91.

[2] Dudley, *Bull. Cornell Univ.* ii. 27 (*Cayuga Fl.*).

[3] Bessey, *Bull. Agric. Exper. Stat. Nebraska*, iv. art. iv. 16.

[4] Where it was collected by Lester F. Ward, whose specimens are preserved in the U. S. Nat. Herb.

[5] Coulter, *Man. Rocky Mt. Bot.* 76.

[6] Much attention has been given in late years by American pomologists to the selection and cultivation of the best fruited varieties of *Prunus Americana*, and their lists now contain the names of many Plum-trees which are selected wild forms of this species. Of these perhaps the best known and the most generally esteemed are De Soto, Itaska, Forest Garden, Louisa, Minnetonka, Cheney, Deep Creek, Kickapoo, Forest Rose, and Miner.

[7] In the Linnæan Herbarium there is an unnamed specimen of *Prunus Americana* without flowers or fruit, and without locality, from Kalm the Swedish traveler, who included in his list of trees growing in the woods near Philadelphia, in 1748, the Wild Plum-tree and the Sloe-Shrub, which he called *Prunus domestica* and *Prunus spinosa* (*Travels*, English ed. i. 67, 68).

[8] As an ornamental plant *Prunus Americana* is not so often seen in the gardens of the eastern and northern states as *Prunus nigra*, which is a less beautiful plant although its flowers are earlier and considerably larger. It is well established in the Arnold Arboretum, where it flowers and fruits abundantly every year, and has proved to be one of the most beautiful plants of the genus.

EXPLANATION OF THE PLATE.

PLATE CL. PRUNUS AMERICANA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. Vertical section of a fruit, natural size.
5. Cross section of a fruit, natural size.
6. A stone, natural size.
7. An embryo, enlarged.
8. A winter branchlet, natural size.

C.E. Faxon del. Rapine sc.

PRUNUS AMERICANA, Marsh.

A. Riocreux direx.t Imp. R. Taneur, Paris.

PRUNUS HORTULANA.

Wild Plum.

CALYX-LOBES glandular-serrate, pubescent on both surfaces. Leaves ovate-lanceolate, long pointed; petioles glandular. Stone turgid, compressed at the two ends, conspicuously rugose and pitted.

Prunus hortulana, L. H. Bailey, *Garden and Forest*, v. 90.

Prunus Americana, var. (?), Patterson, *List Pl. Oquawka*, 5.

Prunus Chicasa, Watson & Coulter, *Gray's Man.* ed. 6, 152 (in part).

A tree, twenty to thirty feet in height, with a slender often inclining trunk frequently five or six or occasionally ten or twelve inches in diameter, dividing, usually several feet from the ground, into stout spreading branches; or often a shrub with many upright stems, forming thicket-like clumps. The bark of the trunk is thin and dark brown, and separates into large thin persistent plates which in exfoliating display the light red-brown inner layers. The branches are stout, rigid, marked with minute pale lenticels, glabrous or sometimes puberulous during their first summer, rather dark brown when the tree grows in the shade of the forest, and usually unarmed; or on vigorous trees grown in the open ground they are sometimes bright red or red-brown in their first year, and darker brown in their second, and are then often armed with stout spinescent spur-like branchlets. The winter-buds are minute and obtuse, and are covered by chestnut-brown scales with slightly ciliate margins, those of the inner ranks accrescent with the growing shoots, oblong-lanceolate, acute, glandular-serrate, and sometimes half an inch long at maturity. The leaves are ovate-lanceolate, contracted at the apex into long slender points, wedge-shaped or more or less rounded at the narrow base, and finely serrate with incurved lanceolate glandular teeth; when they unfold they are pilose with slender white hairs, and at maturity are glabrous with the exception of the hairs which are gathered on the under surface in the axils of the primary veins or are scattered along the midribs; they are rather thick and firm, dark green and lustrous on the upper, and paler on the lower surface, and four to six inches long and an inch to an inch and a half broad, with broad conspicuous midribs orange-colored on the under, and slightly grooved on the upper surface, conspicuous orange-colored veins connected near the margin of the leaf, and prominent reticulate veinlets; they are borne on slender orange-colored petioles which vary from an inch to an inch and a half in length, and are furnished above the middle with numerous small scattered dark glands; and on vigorous shoots stand nearly at right angles with the stems. The stipules are lanceolate-acuminate, glandular-serrate, and early deciduous. The flowers, which in the neighborhood of St. Louis appear by the end of April or early in May with the unfolding of the leaves, vary from two thirds of an inch to an inch in diameter, and are produced in two to four-flowered subsessile umbels, on slender puberulous pedicels half an inch in length. The calyx-tube is narrowly obconic, puberulous on the outer surface, with ovate glandular-serrate lobes acute or rounded at the apex, pubescent on the outer, and pubescent or tomentose on the inner surface, and reflexed after the unfolding of the petals; these are narrowly obovate, rounded and occasionally emarginate at the apex and contracted below into long narrow claws, entire, erose, or occasionally serrate, and pure white, or often marked toward the base with orange. The stamens are as long as the petals or sometimes rather longer, with slender glabrous filaments and minute orange-colored anthers. The pistil is glabrous, with a slender style crowned by a thick truncate stigma. The fruit, which ripens in the neighborhood of St. Louis

in September and October, is borne on stout stems, and is globose or oblong and two thirds of an inch to an inch in diameter, with thick acerb deep red or sometimes yellow skin, and hard and austere thin flesh, which adheres to the turgid stone; this is acute and compressed at the two ends, conspicuously ridge-margined on the ventral, and broadly and deeply grooved on the dorsal suture, thick-walled, rugose, and deeply pitted.

Prunus hortulana inhabits the banks of the Mississippi River near Oquawka, Illinois, and St. Louis, Missouri; it is common on the banks of the Maramec River in Missouri, and will probably be found wild in southern Illinois and Indiana, in western Kentucky and Tennessee, and ranging through Arkansas to eastern Texas. It grows on the low banks of streams in rich moist soil, overflowed every winter and spring for several weeks, in forests of the Hackberry, the Honey Locust, the Sycamore, the Big-nut Hickory, the Swamp White Oak, the Pin Oak, the Green Ash, the Box Elder, and the Red Birch, with the Red Bud, the Silky Cornel, the Pawpaw, dwarf Willows, the Burning Bush, and the deciduous-leaved Holly.

For many years *Prunus hortulana* was confounded with *Prunus angustifolia*, the Chickasaw Plum, to which numerous cultivated Plum-trees that have been derived from it have been referred by pomologists. Mr. Harry N. Patterson[1] many years ago noticed its peculiarities, and Prof. L. H. Bailey[2] has recently pointed out its true characters.

The fruit of the wild trees is gathered in large quantities, and for years has been sold in the markets of St. Louis, and used for jellies and preserves; selected varieties sometimes produce excellent fruit, and have been largely cultivated, in the western states especially, for many years.[3]

[1] Harry Norton Patterson was born in 1853 in Oquawka, Illinois, where he was educated, and where from early youth he has been employed in printing. An early acquired love of botany led him to study the flora of the neighborhood of his native place, and has since carried him on several occasions to Colorado, where he has botanized extensively during four summers, and has made several interesting botanical discoveries. Mr. Patterson is the author of *A List of Plants collected in the Vicinity of Oquawka*, published in 1874, *A Catalogue of the Plants of Illinois*, published in 1876, and a *Check List of North American Plants*.

[2] Liberty Hyde Bailey was born in South Haven, Michigan, in 1858, graduated at the Agricultural College of his native state in 1882, and then, having studied botany with Professor Asa Gray at Cambridge during two years, was appointed in 1888 professor of horticulture and landscape gardening in the Michigan Agricultural College. This position he soon left to accept the chair of horticulture in Cornell University, which he still fills. Professor Bailey is the author of two important papers on North American Carices, three annual volumes of the *Annals of Horticulture in North America*, *The Horticulturist's Rule Book*, *The Nursery Book*, and *Field Notes on Apple Culture*, and of many horticultural and botanical articles. He has devoted special attention to the study of American fruit-trees, and our present knowledge of the history and distinctive characters of the various races of cultivated American Plum-trees is due to his long and careful study of this difficult and interesting subject.

[3] The first variety of this species which attracted attention, the now well-known Wild Goose Plum, believed to have been a native of Kentucky, where it originated about forty years ago, is now a valuable fruit-tree in some parts of the country; it is esteemed for its rapid growth and the excellence of its large juicy fruit, and is more largely cultivated than any other native Plum. Other varieties of *Prunus hortulana* well known to pomologists are Cumberland, Indian Chief, Garfield, Sucker City, Missouri Apricot (Honey Drop), Wayland, Indiana Red, Golden Beauty, Indiana Chief, Forest Rose, Parsons, and Miner (L. H. Bailey, *Bull. Cornell Univ. Agric. Exper. Stat.* No. 38).

A sterile tree, known as the Blackman Plum, believed to be a natural hybrid between the Peach and the Wild Goose Plum, appeared in Tennessee many years ago (*Rep. U. S. Dept. Agric.* 1886, 261; 1887, 636); and Professor Bailey reports another hybrid of similar origin.

EXPLANATION OF THE PLATE.

PLATE CLI. PRUNUS HORTULANA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. Interior face of a calyx-lobe, enlarged.
4. A petal, enlarged.
5. A fruiting branch, natural size.
6. A fruit cut transversely, natural size.

7, 8, and 9. Stones, natural size.

10. A seed, natural size.
11. An embryo, natural size.
12. A sterile branch, natural size.
13. A winter branchlet, natural size.

C.E.Faxon del. Rapine sc.

PRUNUS HORTULANA, Bailey.

A. Riocreux direx.t Imp. R. Taneur, Paris.

PRUNUS ANGUSTIFOLIA.

Chickasaw Plum.

CALYX-LOBES glabrous, glandular-ciliate. Stone turgid. Leaves lanceolate to oblong-lanceolate, thin and lustrous; petioles biglandular.

Prunus angustifolia, Marshall, *Arbust. Am.* 111. — Koch, *Dendr.* i. 103. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 66.

Prunus Chicasa, Michaux, *Fl. Bor.-Am.* i. 284. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 540. — Poiret, *Lam. Dict.* v. 680. — Persoon, *Syn.* ii. 35. — *Nouveau Duhamel*, v. 183. — Elliott, *Sk.* i. 542. — Sprengel, *Syst.* ii. 476. — Audubon, *Birds*, t. 53. — Spach, *Hist. Vég.* i. 397. — Torrey & Gray, *Fl. N. Am.* i. 407. — Roemer, *Fam. Nat. Syn.* iii. 58. — Darlington, *Fl. Cestr.* ed. 3, 73. — Curtis, *Rep. Geolog. Surv. N. Car.* 1860, iii. 56. — Ridgway, *Proc. U. S. Nat. Mus.* 1882, 65. — Watson & Coulter, *Gray's Man.* ed. 6, 152 (in part). — Gray, *Forest Trees N. Am.* t. 47.

Prunus insititia, Walter, *Fl. Car.* 146 (not Linnæus). — Abbot, *Insects of Georgia*, ii. t. 60.

Cerasus Chicasa, Seringe, *De Candolle Prodr.* ii. 538. — Hooker, *Fl. Bor.-Am.* i. 168; *Compan. Bot. Mag.* i. 24. — Don, *Gen. Syst.* ii. 514.

A small tree, fifteen to twenty-five feet in height, with a trunk rarely exceeding eight inches in diameter, and slender spreading virgate branches often armed with long thin spinescent lateral branchlets; or more often a shrub five or six feet high, with many stems, forming broad thickets. The bark of the trunk is an eighth of an inch thick, dark red-brown and slightly furrowed, the surface broken into long thick appressed scales. The branchlets, when they first appear, are glabrous or covered with short caducous hairs, and are bright red and lustrous; in their second year they lose their lustre and grow darker, and are then often brown marked with occasional horizontal orange-colored lenticels. The winter-buds are acuminate and a sixteenth of an inch in length, and covered with chestnut-brown scales. The leaves are lanceolate or oblong-lanceolate, pointed at the two ends, apiculate, and sharply serrate with minute glandular teeth; they are glabrous or, while young, are sometimes furnished on the lower surface with tufts of long pale hairs in the axils of the primary veins, bright green and lustrous on the upper, and paler and rather dull on the lower surface, one to two inches long and a third to two thirds of an inch broad, and are borne on slender glabrous or puberulous bright red petioles, from a quarter to a half of an inch in length, and furnished near the apex with two conspicuous red glands. The stipules are linear or lobed, glandular-serrate, and half an inch long. The flowers, which appear before the leaves from the beginning of March in the extreme southern states until the middle of April at the north, and which are one third of an inch across, are produced in subsessile two to four-flowered umbels, and are borne on slender glabrous pedicels which vary from one fourth to one half of an inch in length. The calyx-tube is glabrous and campanulate, with oblong obtuse lobes, reflexed at maturity, ciliate on the margins with slender hairs, and covered on the inner surface with pale pubescence. The petals are white or creamy white, obovate, rounded at the apex, and contracted at the base into short broad claws. The filaments and pistil are glabrous. The fruit, which ripens between the end of May and the end of July, is globose or subglobose, half an inch in diameter, bright red, rather lustrous, and nearly destitute of bloom, with a thin skin, and tender juicy subacid yellow flesh adherent to the turgid stone, which is more or less thick-margined on the ventral, and conspicuously grooved on the dorsal suture.

Prunus angustifolia is widely naturalized, especially in the southern Atlantic and Gulf states, in all the region from southern Delaware and Kentucky to central Florida, eastern Kansas and eastern Texas. Occupying the margins of fields and other waste places near human habitations, usually in rich soil, it

appears like an escape from cultivation rather than an indigenous plant; and its origin and true home are still uncertain.[1]

The wood of *Prunus angustifolia* is heavy, although rather soft and not strong; it is light brown or red, with lighter colored sapwood and many thin medullary rays. The specific gravity of the absolutely dry wood is 0.6884, a cubic foot weighing 42.90 pounds.

The fruit, which varies greatly in quality, like that of all Plum-trees, is often sold in the markets of the middle and southern states, and it is eaten raw and cooked, and used for jellies and preserves.[2]

William Strachey, who accompanied Admiral Sir George Somers to Jamestown, Virginia, where he landed in May, 1610, and afterward published an account of the colony, is probably the first author to mention the Chickasaw Plum,[3] which was not described by any botanist until a hundred and seventy-five years later, in 1785, when it was included in the *Arbustum Americanum* by Humphrey Marshall.[4]

[1] The Chickasaw Plum has been occasionally cultivated a little to the north of the region in which it has become naturalized, but it has not been able to secure a foothold beyond the northern limits of this region, which is coextensive with that occupied by the Taxodium and several other southern trees. This fact seems to indicate a southern origin, as a plant of such peculiarly domestic habits, able to follow man everywhere in the south, and to hold its own against the native inhabitants of the soil, would have spread through the north if it had come originally from a cold region. The shrubby Plum of the high plateau east of the Rocky Mountains, which travelers have believed to be the original of the Chickasaw Plum, is probably distinct from this species, and it is not improbable that its natural home must be looked for south of the boundary of the United States. The fact that when the country was first visited by Europeans the Chickasaw Plum was always found in the neighborhood of Indian settlements in the south, seems to confirm the early Indian tradition that the tree had been brought by their ancestors from the region beyond the Mississippi River. It is interesting to note that the elder Michaux, who resided for several years in South Carolina toward the end of the last century, was told there that the Chickasaw Plum had been brought from the West Indies (*Fl. Bor.-Am.* i. 285).

[2] The fruit of *Prunus angustifolia* is sold in early summer in the markets of some of the cities of the middle states, under the name of "Mountain Cherry." Varieties of this tree, selected for the excellence of their fruit, are cultivated in the southern states. Of these, the best known to pomologists are Pottawattamie, Jennie Lucas, Early Red, Caddo Chief, Transparent, and Colleta, although many others are in cultivation.

[3] "They have cherries, much like a Damoizin, but for their taste and cullour we called them cherries; and a plomb there is, somwhat fairer then a cherrie, of the same relish, then which are seldome a better eaten." (*Historie of Travaile into Virginia Britannia*, ed. Major, 118.)

[4] According to Loudon, *Prunus angustifolia* was introduced into European gardens in 1806 (*Arb. Brit.* ii. 705). In eastern New England it is barely hardy, seldom flowering and never producing fruit.

EXPLANATION OF THE PLATE.

PLATE CLII. PRUNUS ANGUSTIFOLIA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. Vertical section of a fruit, natural size.
5. A stone, cut transversely, natural size.
6. An embryo, natural size.
7. The end of a young leafy shoot, natural size.
8. A winter branchlet, natural size.

C. E. Faxon del. Picart fr. sc.

PRUNUS ANGUSTIFOLIA, Marsh.

A. Riocreux direx.t Imp. R. Taneur, Paris.

PRUNUS ALLEGHANIENSIS.

Sloe.

CALYX-LOBES entire, puberulous on the outer, tomentose on the inner surface. Fruit usually subglobose, dark blue covered with bloom; stone turgid, acute at the two ends. Leaves lanceolate to oblong-ovate.

Prunus Alleghaniensis, T. C. Porter, *Bot. Gazette*, ii. 85; *Garden and Forest*, iii. 428, f. 53. — Watson & Coulter, *Gray's Man.* ed. 6, 151.

A small slender tree, occasionally eighteen to twenty feet in height, with a trunk which is sometimes six or eight inches in diameter, and which divides into numerous erect rigid branches; or more often a shrub, usually four or five feet high. The bark of the trunk is dark brown and a quarter of an inch thick, the fissured surface broken into thin persistent scales. The branches, when they first appear, are coated with pale pubescence; this soon disappears and in their first winter they are dark red and rather lustrous, later becoming brown or finally nearly black, and are unarmed or sometimes armed with stout spinescent lateral spur-like branchlets, and are covered with minute pale lenticels. The winter-buds are a sixteenth of an inch long, and acuminate or obtuse, the accrescent inner scales scarious, oblong-acute, two thirds of an inch long, and bright red at the apex. The leaves are lanceolate to oblong-ovate, often long-acuminate and finely and sharply serrate with glandular-tipped teeth, and bear at the very base of the blade two large rather conspicuous glands; when they unfold they are covered with soft pubescence, and at maturity are puberulous on the upper surface, and on the lower surface are sometimes quite glabrous with the exception of a few hairs in the axils of the veins, or are covered, especially along the broad midribs and conspicuous veins, with rufous pubescence; they are rather thick and firm in texture, dark green above and paler below, two to three and a half inches long and two thirds of an inch to an inch and a quarter broad, and are borne on slender grooved pubescent or puberulous petioles which vary from a quarter to a third of an inch in length. The flowers, which appear in May with the unfolding of the leaves, are half an inch across when fully expanded, with slender puberulous pedicels from one half to two thirds of an inch in length, arranged in subsessile two to four-flowered umbels. The calyx-tube is narrowly obconic and pubescent or puberulous on the outer surface, with ovate-oblong lobes rounded at the apex, scarious on the margins, and coated with pale tomentum on the inner surface. The petals are pure white, rounded at the apex and contracted at the base into short claws, and in fading turn pink. The filaments and pistil are glabrous. The fruit, which is produced in great quantities and often quite covers the branches, ripens in the middle of August; it is borne on stout puberulous stems, and is subglobose or slightly oval or pear-shaped, and varies from one third to two thirds of an inch in diameter; the skin is thick, rather tough, and dark reddish-purple, covered with a glaucous bloom; the flesh is yellow, juicy, and austere, and adheres to the thin-walled turgid stone which is two thirds as thick as broad, from a quarter of an inch to half of an inch long, pointed at both ends, ridged on the ventral edge, and slightly grooved on the other.

Prunus Alleghaniensis is not known to grow spontaneously outside of a small elevated region in central Pennsylvania, which extends from the slopes of Tussey's Mountain in the northwestern part of Huntingdon County, across Bald Eagle Mountain and Valley, and over the main range of the Alleghanies into Clearfield and Elk Counties, and has a north and south range of only twenty or thirty miles. It grows in low moist soil, where it forms shrubby thickets, sometimes of considerable extent, and on the

dry ridges of the so-called "barrens"[1] of Huntingdon County, where it occasionally assumes the habit of a tree, associated usually with the Wild Crab-apple, the Scarlet Haw, the Bear Oak, the Black Oak, the Pig-nut, and the Red Cedar, reaching its largest size on the limestone bluffs north of the Little Juniata River.[2]

The wood of *Prunus Alleghaniensis* is heavy, hard, and close-grained, with many thin medullary rays; it is brown tinged with red, with thin pale sapwood composed of ten or twelve layers of annual growth; when absolutely dry the specific gravity is 0.7073, a cubic foot weighing 44.13 pounds.

The fruit is collected in large quantities, and is made into excellent preserves, jellies, and jams, which have a considerable local consumption.

Prunus Alleghaniensis was first distinguished by Mr. J. R. Lowrie[3] of Warriorsmark, Pennsylvania, in 1859; and the first account of it was published by Professor Thomas C. Porter[4] in 1877. It was introduced into the gardens of Lafayette College at Easton, Pennsylvania, in 1885, by Professor Porter, through whose agency it has now become an inhabitant of the Arnold Arboretum.

As an ornamental shrub or small tree, *Prunus Alleghaniensis* deserves a place in the garden for its abundant flowers and handsome fruit; this also possesses considerable culinary value, and, like that of other Plum-trees, will probably be improved by selection and cultivation.

[1] The name "barrens" is given to a plateau some twelve hundred feet above tide-water. It is ten or twelve miles broad and lies north of the Little Juniata River between Tussey's Mountain on the east and Bald Eagle Mountain on the west. The soil is sandy and underlaid by limestone which crops out in many places, with many extensive beds of iron ore in the troughs of the limestone. The soil, however, is by no means sterile, and when properly cultivated yields good crops.

[2] There is preserved in the Herbarium of Columbia College a specimen of a Prunus collected in Alabama many years ago by Mr. S. B. Buckley, and referred by Torrey & Gray (*Fl. N. Am.* i. 408) to their var. β. of *Prunus maritima*, and, in the same collection, a specimen of what is described as "a small tree ten to fifteen feet high; fruit oval, small, blue, glaucous, very austere to the taste," and which was seen many years ago in Lincoln County, North Carolina, by Mr. M. A. Curtis, who mentions it in his report of the trees of that state (*Rep. Geolog. Surv. N. Car.* 1860, iii. 56). It is possible, as Professor Britton is inclined to believe, that these specimens represent a southern form of *Prunus Alleghaniensis;* but they are without flowers, and hardly suffice to justify the extension of the range of the species, of which no other trace has been found in the now well explored region of the southern Alleghany Mountains.

[3] Jonathan Roberts Lowrie (1825–1885); a native of Butler, Pennsylvania, and the son of Walter Lowrie, a senator of the United States from Pennsylvania, graduated from Jefferson College in 1843 and devoted himself to the study of law, first practicing his profession at Hollidaysburg in Blair County, and then at Warriorsmark in Huntingdon County, at the foot of the eastern slope of the Alleghany Mountains. Here he passed the remainder of his life, occupied in the management of large business interests, which, however, left him leisure to devote himself to a critical study of the local flora. Lowrie's love of trees and shrubs, which is said to have amounted to a passion, led him to establish a large and interesting arboretum in his park at Warriorsmark, where many noble trees bear witness to his knowledge and skill.

[4] Thomas Conrad Porter, D. D., LL. D., was born at Alexandria, Huntingdon County, Pennsylvania, January 22, 1822, and graduated from Lafayette College in 1840, and from Princeton Theological Seminary in 1843. His father was a Presbyterian elder of more than fifty years standing, a man of influence and note, whose father came to Pennsylvania from Donachedy, Ireland, late in the last century. His maternal great-grandfather, John Conrad Bucher, of a German-Swiss family from the canton of Schaffhausen and a minister of the Reformed Church, emigrated to America in 1755 and died in 1780, the pastor of a congregation at Lebanon, Pennsylvania. Thomas C. Porter served a mission-church in Monticello, Alabama, for one year, and for another year was pastor of the Second Reformed Church of Reading, Pennsylvania. He then became successively professor of natural science in Marshall College, in Franklin and Marshall College, and in Lafayette College, where he has occupied the chair of botany since 1866. For nearly forty years Professor Porter has devoted particular attention to the flora of his native state, and he has built up the great collection of Pennsylvanian plants now preserved in the Herbarium of Lafayette College. He is the author of many papers relating to botany, including *A Catalogue of the Plants of Lancaster County, Pennsylvania*, published in Mombert's history of the county in 1869; *A Sketch of the Botany of Pennsylvania*, in Walling & Gray's Topographical Atlas, published in 1872; *A Sketch of the Botany of the United States*, in Gray's Atlas, published in 1873; *A List of the Carices of Pennsylvania*, published in the *Proceedings of the Academy of Natural Sciences of Philadelphia* in 1887; and of various papers relating to the flora of Colorado and other western territories, included in the reports of government surveys.

EXPLANATION OF THE PLATE.

PLATE CLIII. PRUNUS ALLEGHANIENSIS.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. A fruit, natural size.
5. Vertical section of a fruit, natural size.
6. A stone cut transversely, enlarged.
7. An embryo, enlarged.
8. A winter branchlet, natural size.

C.E. Faxon del. Himely sc.

PRUNUS ALLEGHANIENSIS, Porter

A. Riocreux direx.t Imp. R. Taneur, Paris.

PRUNUS SUBCORDATA.

Wild Plum.

CALYX-LOBES pubescent or puberulous. Stone flattened or turgid, pointed at the two ends. Leaves broadly ovate to orbicular.

Prunus subcordata, Bentham, *Pl. Hartweg.* 308. — Walpers, *Ann.* ii. 464. — Torrey, *Pacific R. R. Rep.* iv. 82. — Newberry, *Pacific R. R. Rep.* vi. 73. — Brewer & Watson, *Bot. Cal.* i. 167 (in part). — J. G. Lemmon, *Pittonia*, ii. 68. — Greene, *Fl. Francis.* 49; *Garden and Forest*, iv. 255.

A small tree, twenty to twenty-five feet in height, with a trunk sometimes a foot in diameter, dividing, six or eight feet from the ground, into stout almost horizontal branches; or often a shrub, with stout ascending stems ten or twelve feet tall, or a low scraggy much branched bush. The bark of the trunk is a quarter of an inch thick, gray-brown, deeply fissured, and divided into long thick plates, their surface broken into minute persistent scales. The young branchlets are glabrous or pubescent, and are covered with bright red bark marked by occasional minute pale lenticels, and in their second year become darker red or purple, ultimately turning dark brown or ashy gray. The winter-buds are acute and an eighth of an inch long, and are covered with chestnut-brown scales with scarious margins, those of the inner rows accrescent with the young shoots and at maturity a quarter of an inch in length, oblong, acute, and generally bright red. The leaves are broadly ovate or orbicular, usually cordate, sometimes truncate, or rarely cuneate at the base, and are sharply and often doubly serrate; when they unfold they are puberulous on the upper, and pubescent on the under surface, and at maturity they are glabrous or more or less puberulous below, an inch to three inches long, half an inch to two inches broad, slightly coriaceous, dark green on the upper, and pale on the lower surface, with broad midribs, grooved on the upper side, and conspicuous veins. The stipules are lanceolate, acute, glandular-serrate, and caducous. In autumn at the north the leaves assume, before falling, brilliant scarlet and orange or red and yellow colors.[1] The flowers, which appear before the leaves in March or April, are two thirds of an inch across and are produced in subsessile two to four-flowered umbels on slender glabrous or pubescent pedicels which vary from a quarter to one half of an inch in length. The calyx is campanulate and glabrous or puberulous, with oblong-obovate lobes rounded at the apex, pubescent on the outer, and more or less covered with pale hairs on the inner surface, and half the length of the white petals which are obovate, rounded above and contracted at the base into short claws, and in fading turn rose-color. The filaments and ovary are glabrous, and the slender style is funnel-shaped at the apex. The fruit, which ripens in August or September, is oblong and from half an inch to an inch and a quarter in length, and is borne on a stout stem from half an inch to two thirds of an inch in length; the skin is dark red or rich purple or sometimes bright yellow; the flesh is more or less succulent, subacid, often of excellent flavor, and adherent to the flattened or turgid stone, which is acute at the two ends, narrowly wing-margined on the ventral edge, conspicuously grooved on the other, and from a third of an inch to an inch in length.[2]

Prunus subcordata inhabits the region west of the Cascade and Sierra Nevada Mountains from

[1] E. W. Hammond, *Garden and Forest*, iii. 626.

[2] J. G. Lemmon distinguishes (*Pittonia*, ii. 67) as variety *Kelloggii*, a form of *Prunus subcordata* first noticed many years ago by Dr. Albert Kellogg, and common in Sierra County and at the base of Mount Shasta, California, with ashy gray branches, nearly glabrous orbicular or elliptical leaves wedge-shaped at the base, and yellow ovate juicy fruit an inch or more in length. (See *Hutching's Magazine*, v. 7. — Wickson, *California Fruits and How to Grow Them*, ed. 2, 51. — Greene, *Fl. Francis.* i. 49.)

southern Oregon to central California. It is found in the neighborhood of streams, sometimes forming thickets of considerable extent, on dry rocky hills and in open woods, and is most common in southern Oregon and northern California, and there produces the best and most abundant fruit, reaching its greatest size on the borders of small streams, in deep rich rather moist soil, where it grows with the Oregon White Oak, the Choke Cherry, the Oregon Hawthorn, the Crab-apple, and various species of Cornel. In central California, where *Prunus subcordata* is common on the foothills of the coast ranges, and often ascends to considerable elevations on the western slopes of the Sierra Nevada, it is usually a low shrub, producing sparingly small acid fruit.

The wood of *Prunus subcordata* is heavy, hard, and close-grained, with a satiny surface susceptible of taking a good polish. It is pale brown, with thin lighter colored sapwood composed of five or six layers of annual growth, and contains many thin inconspicuous medullary rays. The specific gravity of the absolutely dry wood is 0.6412, a cubic foot weighing 40.01 pounds.

The fruit of *Prunus subcordata* is collected in Oregon and northern California, and is consumed in large quantities both fresh and dried, and is used for preserves and jellies.[1]

The first botanists who explored Oregon and California failed to notice the Wild Plum, and it was not known until 1836 or 1837, when Karl Theodore Hartweg[2] found it in the upper valley of the Sacramento River.

[1] In northern California, where for several years some attention has been paid to improving it, *Prunus subcordata* produces in cultivation more abundant crops of larger fruit than are borne on the wild trees; and the quality of the fruit of selected seedlings shows that valuable garden varieties can be obtained from this species. It has also been found useful as stock upon which to graft varieties of the European Plums. (See *Rep. Cal. Agric. Soc.* 1858, 183. — *Pacific Rural Press*, iv. 163, 198. — Wickson, *California Fruits and How to Grow Them*, ed. 2, 52.)

[2] See ii. 34.

EXPLANATION OF THE PLATE.

PLATE CLIV. PRUNUS SUBCORDATA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. Vertical section of a fruit, natural size.
5, 6, and 7. Stones, natural size.
8. An embryo, enlarged.
9. Winter branchlet, natural size.

C.E. Faxon del.

Himely sc.

PRUNUS SUBCORDATA, Benth.

A. Riocreux direx.t

Imp. R. Taneur, Paris.

PRUNUS UMBELLATA.

Sloe. Black Sloe.

CALYX-LOBES entire, glabrous or pubescent on the outer, tomentose on the inner surface. Fruit black covered with bloom. Leaves obovate-lanceolate to oblong.

Prunus umbellata, Elliott, *Sk.* i. 541. — Dietrich, *Syn.* iii. 44. — Chapman, *Fl.* 119. — Sargent, *Forest Trees N. Am. 10th Census U. S.* ix. 67.

? **Prunus pumila**, Walter, *Fl. Car.* 146 (not Linnæus).

Cerasus umbellata, Torrey & Gray, *Fl. N. Am.* i. 409. — Roemer, *Fam. Nat. Syn.* iii. 78.

A tree, sometimes fifteen or twenty feet in height, with a short often crooked or inclining trunk six to ten inches in diameter, and slender unarmed branches which form a wide compact flat-topped head; or frequently a low shrub. The bark of the trunk is a quarter of an inch thick, the dark brown surface separating into small appressed persistent scales. The branchlets, when they first appear, are more or less densely coated for a short time with pale pubescence; they soon become glabrous and are covered with a lustrous bright red bark which, in their second year, is dark brown and lustreless, and is marked with occasional orange-colored oblong lenticels. The winter-buds are a sixteenth of an inch long and are protected by acute chestnut-brown apiculate scales; those of the inner rows lengthen with the young shoots and at maturity are a quarter of an inch in length and red-tipped. The leaves are obovate-lanceolate to oblong, acute at both ends or sometimes rounded or slightly cordate at the base, finely and sharply serrate with remote incurved glandular teeth, and usually furnished with two large dark glands at the very base of the blade; when they unfold they are bright bronze-green with red margins, midribs, and petioles, and are membranaceous, glabrous on the upper surface, and pubescent or glabrous on the lower with the exception of a few hairs along the prominent orange-colored midribs and primary veins; at maturity they are two to two and a half inches in length and an inch to an inch and a half in breadth, membranaceous, dark green above and paler below, and are borne on stout glabrous or pubescent petioles. The stipules are lanceolate, setaceous, glandular-serrate, from one fourth to two thirds of an inch long, and caducous. The flowers, which expand in March and April before the appearance of the leaves, are two thirds of an inch across and are borne on slender glabrous pedicels half an inch long, in three or four-flowered subsessile umbels. The calyx-tube is broadly obconic, glabrous or puberulous on the outside, with acute red tipped lobes sometimes slightly cleft at the apex, scarious on the margins, and coated on the inner surface with thick white tomentum. The petals are nearly orbicular and are contracted at the base into short claws. The filaments and pistil are glabrous. The fruit, which ripens from July to September, is borne on a slender stem which varies from half an inch to nearly an inch in length; it is globose without a basal depression, half an inch in diameter, and is tipped with the remnant of the style; the skin is tough, thick, and bright red when the fruit is first fully grown, but black or nearly so when it is ripe, and then covered with a glaucous bloom; the flesh is thick and acid and adheres to the flattened stone, which is half as thick as it is broad, acute at both ends, slightly rugose, conspicuously ridged on one margin and slightly grooved on the other, with thin and brittle walls.

Prunus umbellata is distributed through the maritime portions of the southern Atlantic and Gulf states from South Carolina to Mosquito Inlet in Florida, and from Tampa Bay to eastern Mississippi; it reappears on the banks of the Mississippi River near Baton Rouge, Louisiana, and is scattered through the valley of the Red River from Alexandria to Shreveport, Louisiana, and to near Camden in southern Arkansas. It grows on the rich sandy bottom-lands of rivers and large creeks, and along

the borders of the forests of Long-leaved Pine, which it enlivens in the early days of spring with its profusion of pure white flowers.

The wood of *Prunus umbellata* is heavy, hard, and close-grained, with many thin medullary rays; it is dark red-brown, with thick lighter colored sapwood composed of about thirty layers of annual growth. The specific gravity of the absolutely dry wood is 0.8202, a cubic foot weighing 51.11 pounds.

The fruit is gathered in large quantities and is used in making jellies and jams.

Prunus umbellata appears to have escaped the notice of the botanists who explored the flora of the southern states during the last century, and was first distinguished by Stephen Elliott, who published the earliest account of it in his *Sketch of the Botany of South Carolina and Georgia*.[1]

[1] It is remarkable that this very distinct and common plant, which in early spring is a most attractive and conspicuous feature of the coast region of Georgia and northern Florida, should have been overlooked by such keen observers as Catesby, John and William Bartram, and the two Michauxs, who were all familiar with this region and who traveled several times through a portion of it at least. Elliott considered the *Prunus pumila* of Walter (*Fl. Car.* 146) identical with his *Prunus umbellata*, but Walter's description is so meagre and vague that the identity of his plant is very doubtful.

EXPLANATION OF THE PLATE.

PLATE CLV. PRUNUS UMBELLATA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. Vertical section of a fruit, part of the flesh removed, natural size.
5. Vertical section of a stone, enlarged.
6. An embryo, enlarged.
7. A stone, natural size.
8. Part of a leafy young branchlet with stipules, natural size.

C.E. Faxon del. Picart fr. sc.

PRUNUS UMBELLATA, Ell.

A. Riocreux dirext. Imp. R. Taneur, Paris.

PRUNUS PENNSYLVANICA.

Wild Red Cherry. Bird Cherry.

CALYX-LOBES obtuse, entire. Stone oblong. Leaves oblong-lanceolate, long-pointed.

Prunus Pennsylvanica, Linnæus f. *Syst.* ed. 13, Suppl. 252. — Willdenow, *Berl. Baumz.* 248; *Spec.* ii. pt. ii. 992; *Enum.* 518. —Abbot, *Insects of Georgia*, i. t. 45. — Poiret, *Lam. Dict.* v. 673. — Persoon, *Syn.* ii. 35. — Pursh, *Fl. Am. Sept.* i. 331. — Nuttall, *Gen.* i. 302. — Sprengel, *Syst.* ii. 477. — Hayne, *Dendr. Fl.* 73. — Dietrich, *Syn.* iii. 42. — Chapman, *Fl.* 120. — Curtis, *Rep. Geolog. Surv. N. Car.* 1860, iii. 57. — Koch, *Dendr.* i. 117. — Brunet, *Cat. Vég. Lig. Can.* 21. — Emerson, *Trees Mass.* ed. 2, ii. 513. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 66. — Coulter, *Man. Rocky Mt. Bot.* 77. — Watson & Coulter, *Gray's Man.* ed. 6, 152.

Prunus-Cerasus montana, Marshall, *Arbust. Am.* 113.

Prunus lanceolata, Willdenow, *Berl. Baumz.* 240, t. 3, f. 3.

Cerasus borealis, Michaux, *Fl. Bor.-Am.* i. 286. — *Nouveau Duhamel*, v. 32. — Michaux f. *Hist. Arb. Am.* iii. 159, t. 8. — De Candolle, *Prodr.* ii. 538. — Don, *Gen. Syst.* ii. 513. — Loudon, *Arb. Brit.* ii. 703, f. 410. — Roemer, *Fam. Nat. Syn.* iii. 78.

Prunus borealis, Poiret, *Lam. Dict.* v. 674. — Pursh, *Fl. Am. Sept.* i. 330. — W. P. C. Barton, *Compend. Fl. Phil.* i. 223. — Nuttall, *Gen.* i. 302. — Loddiges, *Bot. Cab.* t. 1598. — Bigelow, *Fl. Boston.* ed. 2, 193.

Prunus persicifolia, Desfontaines, *Hist. Arb.* ii. 205.

Cerasus Pennsylvanica, Loiseleur, *Nouveau Duhamel*, v. 9. — De Candolle, *Prodr.* ii. 539. — Hooker, *Fl. Bor.-Am.* i. 168. — Don, *Gen. Syst.* ii. 514. — Torrey & Gray, *Fl. N. Am.* i. 409. — Gray, *Forest Trees N. Am.* t. 48.

Cerasus persicifolia, Loiseleur, *Nouveau Duhamel*, v. 9. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 530. — De Candolle, *Prodr.* ii. 537. — Don, *Gen. Syst.* ii. 513. — Spach, *Hist. Vég.* i. 411. — Roemer, *Fam. Nat. Syn.* iii. 81. — Carrière, *Rev. Hort.* 1869, 272, f. 63.

A tree, with bitter aromatic bark and leaves, thirty to forty feet in height, with a trunk often twelve or eighteen inches in diameter, and regular slender horizontal branches which form a narrow head usually more or less rounded at the summit; or, at the extreme northern and western limits of its range, often a low shrub. The bark of the trunk, which varies from one third to one half of an inch in thickness, separates horizontally into broad persistent papery plates with a dark red-brown surface marked with irregular horizontal bands of orange-colored lenticels, and is smooth on young stems or branches but on old trees is broken into minute persistent scales. The branches, when they first appear, are light red and sometimes slightly puberulous; they soon become glabrous, and in their first winter are bright red, lustrous, and covered with pale excrescences; in their second year short thick lateral spur-like branchlets are developed, and the outer bark, which has now lost its lustre and is marked by bright orange-colored lenticels, is easily separable from the brilliant green inner bark. The leaves are oblong-lanceolate, sometimes slightly falcate, long pointed and finely and sharply serrate with incurved teeth often tipped with minute glands; for a short time after they first unfold they are bronze-green, pilose on the lower surface and slightly viscid; they soon become green and glabrous, and at maturity are bright and lustrous on the upper, and rather paler on the lower surface, three to four and a half inches long and three quarters of an inch to an inch and a quarter broad, and are borne on slender glabrous or slightly pilose petioles which vary from half an inch to nearly an inch in length, and are often glandular above the middle. The stipules are acuminate, glandular-serrate, and early deciduous. The leaves in autumn turn a bright clear yellow some time before falling. The flowers, which appear in early May when the leaves are half grown, or at the extreme north and at high elevations as late as the first of July, are half an inch across when expanded, and are borne on slender pedicels nearly an inch in length collected in four or five-flowered umbels, which are generally clustered two or three together and are subsessile when the flowers expand, but ultimately stalked. The calyx-tube is glabrous, broadly obconic with obtuse lobes tipped with red and reflexed at maturity, and is

marked in the mouth of the throat with a conspicuous light orange-colored band. The petals are creamy white, a quarter of an inch long, nearly orbicular, and contracted at the base into short claws. The filaments and pistil are glabrous. The fruit, which ripens between the first of July and the first of September, is globular, a quarter of an inch in diameter, tipped with the remnant of the style, and light red with a thick skin, thin sour flesh, and an oblong stone which has thin brittle walls and is ridged on the ventral margin.

Prunus Pennsylvanica is distributed from Newfoundland to the shores of Hudson's Bay and west to the eastern slopes of the coast range of British Columbia in the valley of the Frazer River,[1] and south through the northern states to Pennsylvania, central Michigan, northern Illinois, and central Iowa. It is common on the high mountains of North Carolina, on the eastern slopes of the Rocky Mountains of Colorado, and in all the forest regions of the extreme northern states, growing in moist rather rich soil, reaching its greatest size on the western slopes of the Big Smoky Mountains in Tennessee, and often occupying, to the exclusion of other trees, large areas cleared by fire of their original forest covering.[2]

The wood of *Prunus Pennsylvanica* is light, soft, and close-grained, with numerous medullary rays. It is light brown, with thin yellow sapwood, and when absolutely dry has a specific gravity of 0.5023, a cubic foot weighing 31.30 pounds.

The fruit is often used domestically and by herbalists in the preparation of cough-mixtures.

Prunus Pennsylvanica[3] was first introduced into English gardens in 1773[4] by Lee & Kennedy, nurserymen at Hammersmith, although it was not described until eight years later; and it was established in the Botanical Gardens of Berlin toward the end of the last century.[5] It grows rapidly in cultivation, and is a handsome and shapely although short-lived tree, and in early spring is conspicuous for the great quantity of flowers which cover its branches.

[1] Macoun, *Cat. Can. Pl.* i. 125.

[2] The ease with which the seeds of *Prunus Pennsylvanica* are disseminated by birds and mountain streams, their vitality and power of germination in soil where the upper layers of humus have been destroyed by fire, and the rapid growth of the young plants, which soon form a covering for longer lived trees, constitute the chief value and interest of this plant, which, in the northern part of the country east of the mid-continental plateau, has played an important part in the reproduction and preservation of the forests. (See Michaux f. *Hist. Arb. Am.* iii. 160. — Robert Douglas, *Garden and Forest*, ii. 285.)

[3] In some parts of the country *Prunus Pennsylvanica* is also called Pin Cherry and Pigeon Cherry.

[4] Aiton, *Hort. Kew.* ed. 2, iii. 198.

[5] Willdenow, *Berl. Baumz.* 248.

EXPLANATION OF THE PLATE.

PLATE CLVI. PRUNUS PENNSYLVANICA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. Vertical section of a fruit, enlarged.
5. Cross section of a fruit, enlarged.
6. An embryo, enlarged.
7. Portion of a leaf with stipules, natural size.
8. A winter branchlet, natural size.

C.E. Faxon del. Picart fr. sc.

PRUNUS PENNSYLVANICA, L.F.

A. Riocreux dirext. Imp. R. Taneur, Paris.

PRUNUS EMARGINATA.

Wild Cherry.

CALYX-LOBES rounded or sometimes emarginate. Stone ovoid, pointed at the two ends. Leaves oblong-obovate to oblanceolate, usually rounded at the apex.

Prunus emarginata, Walpers, *Rep.* ii. 9. — Dietrich, *Syn.* iii. 42. — Watson, *King's Rep.* v. 79. — Torrey, *Bot. Wilkes Explor. Exped.* 284. — Brewer & Watson, *Bot. Cal.* i. 167. — Sargent, *Forest Trees N. Am. 10th Census U. S.* ix. 67.

Cerasus emarginata, Douglas; Hooker, *Fl. Bor.-Am.* i. 169. — Don, *Gen. Syst.* ii. 515. — Loudon, *Arb. Brit.* ii. 714. — Torrey & Gray, *Fl. N. Am.* i. 410. — Roemer, *Fam. Nat. Syn.* iii. 79. — Torrey, *Pacific R. R. Rep.* iv. 83. — Bolander, *Proc. Cal. Acad.* iii. 79.

Cerasus erecta, Presl, *Epimel. Bot.* 194.

Prunus erecta, Walpers, *Ann.* iii. 854.

Cerasus Pattoniana, Carrière, *Rev. Hort.* 1872, 135, f. 17.

Cerasus glandulosa, Kellogg, *Proc. Cal. Acad.* i. 59.

A tree, with exceedingly bitter bark and leaves, thirty to forty feet in height, with a trunk twelve to fourteen inches in diameter, dividing into a number of slender rather upright branches which form a symmetrical oblong head; or often a shrub with spreading stems three to ten feet tall. The bark of the trunk is a quarter of an inch thick, with a generally smooth dark brown surface marked by horizontal light gray interrupted bands, and by rows of oblong orange-colored lenticular excrescences. The branches, when they first appear, are coated with pale pubescence, and are slender and flexible; in their first winter they are covered with dark red-brown bark marked by many minute dots, and in their second season, when they develop short lateral branchlets, with bright red bark conspicuously marked by large pale lenticels. The winter-buds are acute, an eighth of an inch long, and covered with chestnut-brown scales often slightly scarious on the margins; those of the inner ranks are acuminate at maturity, glandular-serrate above the middle, scarious, and nearly half an inch in length, with bright red tips. The leaves are oblong-obovate to oblanceolate, rounded, and usually obtuse or sometimes acute at the apex, the two forms appearing occasionally on the same branch; they are narrowed at the base, which is generally furnished with one or two and sometimes three or four large dark glands, and are serrate, the minute teeth tipped with short subulate glandular points; when they unfold they are puberulous or pubescent on the lower surface and slightly viscid, and when fully grown are glabrous or pubescent on the lower surface, one to three inches long and from one third of an inch to one and a half inches broad, dark green above, paler below, and borne on short stout grooved and usually pubescent petioles. The stipules are lanceolate-acuminate, glandular-serrate, and early deciduous. The flowers, which appear when the leaves are about half grown, at the end of April at the level of the ocean or as late as the end of June at high elevations, and which when expanded vary from one third to one half of an inch in diameter, are produced in six to twelve-flowered glabrous or pubescent corymbs an inch to an inch and a half in length, on slender pedicels from the axils of foliaceous glabrous glandular-serrate bracts. The calyx-tube is obconic, glabrous, or puberulous on the outer surface, and bright orange-colored in the throat, with short lobes rounded or emarginate or somewhat cleft at the apex, sometimes slightly glandular on the margins, and reflexed at maturity. The petals are white faintly tinged with green, obovate, rounded or emarginate at the apex, and contracted below into short claws. The ovary[1] and filaments are glabrous, and the style, which enlarges into a stout clavate stigma, is sometimes slightly glandular. The fruit, which ripens from June to August, is globose, from one fourth to one half of an inch in diameter, and more or less translucent, and when first fully grown is bright red, becoming

[1] In northeastern Idaho Professor Greene found bipistillate flowers of this species, with two drupes from each flower (*Garden and Forest*, iv. 243).

darker and almost black when ripe; the flesh is thin, bitter, and astringent; the stone is ovoid and pointed at both ends, with a prominent grooved ridge on the ventral margin, and is rounded and slightly grooved on the other, with thick brittle and slightly pitted walls.[1]

Prunus emarginata is distributed from the valley of the upper Jocko River in Montana[2] along the mountain ranges of Idaho and Washington and of southern British Columbia to Vancouver Island,[3] and through western Oregon and northern California and along the coast ranges to the neighborhood of the Bay of San Francisco, and on the western slopes of the Sierra Nevada Mountains, where it sometimes reaches an elevation of five or six thousand feet, to the Yosemite Valley; it is common on the Santa Lucia and San Bernardino Mountains[4] in California: on the eastern slopes of the Sierras it ranges to the shores of Lake Tahoe and the neighborhood of Carson City,[5] and it occurs on the Washoe Mountains[6] in Nevada. *Prunus emarginata* grows usually near the banks of streams in low rich soil, or less commonly on dry hill-slopes, attaining its best dimensions on Vancouver Island, in western Oregon and Washington, and on the Santa Lucia Mountains of California, where, at elevations of from three to four thousand feet, it becomes a tree sometimes forty feet in height; on the coast ranges of middle California and on the Sierra Nevada Mountains it is commonly a shrub five to eight feet high.[7]

The wood of *Prunus emarginata* is close-grained, soft, and brittle, and contains numerous thin medullary rays; it is brown streaked with green, with paler sapwood composed of eight or ten layers of annual growth. The specific gravity of the absolutely dry wood is 0.4502, a cubic foot weighing 28.06 pounds.

The fruit is said to have been eaten by the Indians of the northwestern coast.[8]

Prunus emarginata was discovered in the valley of the Columbia River in 1825 by David Douglas.[9] It is cultivated as a shade tree in the streets of Portland, Oregon, where it attains the height of forty feet, and assumes the habit of the common European Cherry-tree;[10] in 1881 it was introduced from Oregon into the Arnold Arboretum, where it is perfectly hardy, flowering and ripening its fruit every year.[11]

[1] *Prunus emarginata* varies in the amount of pubescence which clothes the young shoots, the lower surface of the foliage, and the inflorescence. At the north it is more often pubescent than glabrous, and the pubescent form is not uncommon on the mountains of southern California. It has been distinguished as —

Var. *mollis*, Brewer & Watson, *Bot. Cal.* i. 167. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 67. — Macoun, *Cat. Can. Pl.* i. 125.

Cerasus mollis, Douglas; Hooker, *Fl. Bor.-Am.* i. 164. — Hooker, *Lond. Jour. Bot.* vi. 217. — Don, *Gen. Syst.* ii. 515. — Torrey & Gray, *Fl. N. Am.* i. 410. — Loudon, *Arb. Brit.* ii. 714. — Nuttall, *Sylva*, ii. 14, t. 46. — Roemer, *Fam. Nat. Syn.* iii. 79. — Cooper, *Pacific R. R. Rep.* xii. pt. ii. 29, 59; *Am. Nat.* iii. 406. — Lyall, *Jour. Linn. Soc.* vii. 131.

Prunus mollis, Walpers, *Rep.* ii. 9. — Dietrich, *Syn.* iii. 42. — Torrey, *Bot. Wilkes Explor. Exped.* 284. — Macoun, *Rep. Geolog. Surv. Can.* 1875–76, 194.

[2] Here it was found in 1883 by Canby and Sargent.

[3] Macoun, *l. c.* 513.

[4] The pubescent form of *Prunus emarginata* was discovered in Bear Valley in June, 1885, by Mr. S. B. Parish.

[5] Here it was collected in 1864 by Dr. C. L. Anderson.

[6] Teste Watson, *King's Rep.* v. 79.

[7] The shrubby glabrous Cherry-tree of central California is considered by Professor Greene a species, to which he has given the name of *Cerasus Californica* (*Fl. Francis.* i. 50. — *Garden and Forest*, iv. 243). Numerous forms appear to connect this plant with the arborescent form of the north and of the Santa Lucia Mountains in the south, and its shrubby habit, small leaves, and more astringent fruit are perhaps the result of the peculiar climatic conditions to which it has been subjected.

[8] R. Brown (Campst.), *Trans. Bot. Soc. Edinburgh*, ix. 383.

[9] See ii. 94.

[10] Greene, *Garden and Forest*, iv. 243.

[11] *Prunus emarginata* was probably introduced into Scotch gardens by the Scotch collector John Jeffrey in 1851 or 1852, as at that time he sent the seeds of many of the plants of our northwestern coast to the members of the so-called Oregon Expedition, whose agent he was. It was sent from the Edinburgh Botanic Garden to the Muséum d'Histoire Naturelle in Paris in 1865, as *Prunus Pattoniana*, a name which does not appear to have been published (Carrière, *Rev. Hort.* 1872, 135).

EXPLANATION OF THE PLATE.

Plate CLVII. Prunus emarginata.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. Vertical section of a fruit, enlarged.
5. A stone, enlarged.
6. Part of a leafy branch showing stipules, natural size.
7. A winter branchlet, natural size.

C. E. Faxon del. Picart fr. sc.

PRUNUS EMARGINATA, Walp.

A. Riocreux dirext Imp. R. Taneur, Paris.

PRUNUS VIRGINIANA.

Choke Cherry. Wild Cherry.

CALYX-LOBES deciduous. Stone oblong-ovate, pointed. Leaves broadly oval to oblong-obovate, usually abruptly acuminate.

Prunus Virginiana, Linnæus, *Spec.* 473 (excl. syn.). — Willdenow, *Berl. Baumz.* 238, t. 5, f. 1; *Spec.* ii. pt. ii. 985; *Enum.* 517. — Desfontaines, *Hist. Arb.* ii. 203. — Persoon, *Syn.* ii. 34. — Hayne, *Dendr. Fl.* 70. — Guimpel, Otto & Hayne, *Abbild. Holz.* 43, t. 36. — Sprengel, *Syst.* ii. 478. — Dietrich, *Syn.* iii. 42. — Torrey, *Bot. Mex. Bound. Surv.* 62. — Koch, *Dendr.* i. 121. — Chapman, *Fl.* 120. — Watson, *King's Rep.* v. 80. — Emerson, *Trees Mass.* ed. 2, ii. 518, t. — Brewer & Watson, *Bot. Cal.* i. 167. — Watson & Coulter, *Gray's Man.* ed. 6, 152.

Padus rubra, Miller, *Dict.* ed. 8, No. 2.

Prunus nana, Du Roi, *Harbk. Baumz.* ii. 194, t. 4.

Prunus-Cerasus Canadensis, Marshall, *Arbust. Am.* 113.

Prunus rubra, Aiton, *Hort. Kew.* ii. 162. — Willdenow, *Berl. Baumz.* ed. 2, 299. — Guimpel, Otto & Hayne, *Abbild. Holz.* 98, t. 78.

Padus oblonga, Moench, *Meth.* 671.

Prunus serotina, Poiret, *Lam. Dict.* v. 665 (not Ehrhart). — Pursh, *Fl. Am. Sept.* i. 330. — Elliott, *Sk.* i. 541. — Torrey, *Fl. N. Y.* i. 196.

Cerasus Virginiana, Loiseleur, *Nouveau Duhamel*, v. 3 (excl. syn. Michaux). — De Candolle, *Prodr.* ii. 539. — Spach, *Hist. Vég.* i. 414. — Torrey & Gray, *Fl. N. Am.* i. 410. — Torrey, *Fl. N. Y.* i. 196; *Nicollet's Rep.* 149; *Frémont's Rep.* 89; *Emory's Rep.* 408; *Pacific R. R. Rep.* iv. 83. — Emerson, *Trees Mass.* 456. — Gray, *Man.* 115; *Pacific R. R. Rep.* xii. pt. ii. 42. — Darlington, *Fl. Cestr.* ed. 3, 74. — Cooper, *Pacific R. R. Rep.* xii. pt. ii. 30; *Am. Nat.* iii. 406.

Prunus hirsuta, Elliott, *Sk.* i. 541.

Prunus obovata, Bigelow, *Fl. Boston.* ed. 2, 192.

Cerasus serotina, Hooker, *Fl. Bor.-Am.* i. 169 (excl. syn.; not Loiseleur). — Don, *Gen. Syst.* ii. 515.

Cerasus obovata, Beck, *Bot.* 97. — Eaton & Wright, *Bot.* 189.

Cerasus micrantha, Spach, *Hist. Vég.* i. 414.

Cerasus densiflora, Spach, *Hist. Vég.* i. 415.

Cerasus fimbriata, Spach, *Hist. Vég.* i. 416.

Cerasus hirsuta, Spach, *Hist. Vég.* i. 417. — Eaton & Wright, *Bot.* 190.

Cerasus Virginiana, var. *β.* Torrey & Gray, *Fl.* i. 410.

Cerasus Duerinckii, Martens, *Sel. Sem. Hort. Lovan.* 1840; *Bull. Bot. Soc. Brux.* viii. 68.

Prunus Duerinckii, Walpers, *Rep.* ii. 10.

Padus fimbriata, Roemer, *Fam. Nat. Syn.* iii. 84.

Padus densiflora, Roemer, *Fam. Nat. Syn.* iii. 84.

Padus micrantha, Roemer, *Fam. Nat. Syn.* iii. 84.

Padus obovata, Roemer, *Fam. Nat. Syn.* iii. 86.

Padus hirsuta, Roemer, *Fam. Nat. Syn.* iii. 87.

A tree, with strong-scented bark[1] and leaves, rarely thirty to thirty-five feet in height, with a short and often crooked or inclining trunk sometimes a foot in diameter, small erect or horizontal branches, and stout branchlets which form a narrow irregular head; or more often a low shrub. The bark of the trunk is an eighth of an inch thick, slightly and irregularly fissured, broken on the surface into small persistent scales, and often marked by irregular pale excrescences. The branches, when they first appear, are light brown, or bronze-green, and glabrous, puberulous, or sometimes pubescent, and in their first winter are light brown or brown tinged with red and marked with large oblong lenticels; in their second year they become darker brown, and the tough outer layer of bark is easily separable in horizontal strips from the bright green inner layers. The winter-buds are acute or obtuse and are covered by pale chestnut-brown scales, more or less scarious on the margins and rounded at the apex, those of the inner rank accrescent, lanceolate or ligulate, sharply and often glandular-serrate, chartaceous, and from half an inch to an inch in length. The leaves are broadly oval or more or less oblong-obovate, usually abruptly acuminate at the apex, wedge-shaped, rounded or subcordate at the base, and sharply and often deeply serrate with subulate spreading teeth; when they unfold they are glabrous with the excep-

[1] The strong disagreeable odor of the inner bark of the branches of this species affords the best character for distinguishing it in winter from *Prunus serotina*, the inner bark of which has an aromatic and rather agreeable perfume. The branches of the former are usually much stouter than those of the latter.

tion of conspicuous tufts of pale hairs in the axils of the principal veins on the lower surface, or are puberulous or pubescent; at maturity they are membranaceous, bright green above, paler and sometimes pubescent below, two to four inches in length and an inch to two inches broad, and are borne on slender grooved petioles biglandular near the apex, or sometimes, especially on vigorous shoots, many-glandular. The stipules are lanceolate, acute, glandular-serrate, half an inch long, and early deciduous. The leaves turn yellow in the autumn some time before falling. The flowers, which are from one third to one half of an inch in diameter, appear from the first of April in the south to the end of June at the extreme north; they are borne on slender glabrous or puberulous pedicels produced from the axils of scarious caducous bracts in slender many-flowered erect or nodding racemes three to six inches long. The calyx-tube is cup-shaped, glabrous or rarely puberulous, with short broad obtuse reflexed deciduous lobes, laciniate or more or less glandular on the margins. The petals are pure white, orbicular, and contracted below into short claws. The filaments and pistil are glabrous, and the short thick style is abruptly enlarged into a broad orbicular stigma. The fruit, which varies from one fourth to one third of an inch in diameter, is globose or occasionally somewhat elongated, bright red when first fully grown, and when perfectly ripe is dark vinous red or almost black, or rarely yellow or amber-colored,[1] with a thick lustrous skin, dark juicy flesh, and an oblong-ovate stone, broadly ridged on one margin and acute on the other. In early autumn the fruit is austere and astringent, but later loses much of its astringency and becomes sweet and edible.[2]

Prunus Virginiana is the most widely distributed North American tree; it grows within the arctic circle,[3] ranging across the continent from Labrador and the shores of Hudson's Bay to the valley of the Mackenzie River in latitude 62°, and, crossing the Rocky Mountains, reaches the Pacific coast in northern British Columbia;[4] it extends southward through eastern North America to southern Georgia, Louisiana, Texas, northern Mexico,[5] and along the mountain ranges of western North America. In the eastern states it is one of the most common of the large tree-like shrubs, growing usually on the margins of the forest, generally in rich rather humid soil, and along highways and fence-rows; in southern Oregon and northern California it inhabits low valleys where, in rich moist soil in the neighborhood of streams, it attains a large size and arborescent habit; on the mountain ranges of the interior of the continent, where it is confined to elevated valleys, in southern California, and at the northern and southern limits of its range, it is a low shrub.

The wood[6] of *Prunus Virginiana* is heavy, hard, and close-grained, although not strong; it contains numerous conspicuous medullary rays, and is light brown, with thick lighter colored sapwood composed of fifteen to twenty layers of annual growth. The specific gravity of the absolutely dry wood is 0.6951, a cubic foot weighing 43.32 pounds.

[1] A yellow-fruited form of *Prunus Virginiana* (var. *leucocarpa*, Watson, *Bot. Gazette*, xiii. 233) was found in Dedham, Massachusetts, a few years ago; and plants with light-colored fruit are sometimes cultivated in Canadian gardens, and in those of northern Europe (J. G. Jack, *Garden and Forest*, v. 135).

[2] The western Choke Cherry has usually been considered a species. Extreme forms, especially those of the mid-continental regions, vary slightly from the eastern plant in the shape of their leaves, which are more often rounded or subcordate than cuneate at the base, and are sometimes pale on the lower surface, in their more abundant and persistent pubescence, and their greater thickness and consistency. It is not easy, however, to find stable characters upon which to establish even a geographical variety; for the extreme forms pass insensibly one into the other, showing the gradual influence of a dry climate in increasing the thickness and the hairy covering of leaves. The synonymy of the western plant is as follows: —

Prunus demissa, Walpers, *Rep.* ii. 10. — Dietrich, *Syn.* iii. 43. — Bentham, *Pl. Hartweg.* 307. — Torrey, *Bot. Mex. Bound. Surv.* 63. — Watson, *King's Rep.* v. 80. — Rothrock, *Pl. Wheeler*, 37. — Brewer & Watson, *Bot. Cal.* i. 167. — Macoun, *Cat. Can. Pl.* i. 125. — Sargent, *Forest Trees N. Am. 10th Census U. S.* ix. 69. — Greene, *Fl. Francis.* 51. — T. S. Brandegee, *Zoë*, ii. 157. — Bessey, *Bull. Agric. Exper. Stat. Nebraska*, iv. art. iv. 18.

Cerasus serotina, Hooker, *Fl. Bor.-Am.* i. 169 (in part).

Cerasus demissa, Nuttall; Torrey & Gray, *Fl. N. Am.* i. 411. — Torrey, *Pacific R. R. Rep.* iv. 83. — Newberry, *Pacific R. R. Rep.* vi. 73. — Cooper, *Pacific R. R. Rep.* xii. pt. ii. 59.

Padus demissa, Roemer, *Fam. Nat. Syn.* iii. 87.

Prunus Virginiana, var. *demissa*, Torrey, *Bot. Wilkes Explor. Exped.* 284. — Gray, *Proc. Am. Acad.* viii. 381.

[3] Hooker f. *Trans. Linn. Soc.* xxiii. 290 (*Distribution Arctic Pl.*).

[4] Macoun, *Cat. Can. Pl.* i. 125.

[5] Hemsley, *Bot. Biol. Am. Cent.* i. 368.

[6] The specimen of wood tested in the United States Census investigation was taken from a tree grown in southern Oregon.

In Canada the fruit, which is gathered in great quantities and is sold in the markets of the large cities, is eaten by the French Canadians, and was formerly an important article of food among the northern Indians,[1] as well as among those inhabiting the western and central parts of the continent.

Prunus Virginiana early attracted the attention of European colonists,[2] although it does not appear to have been introduced into European gardens until the middle of the eighteenth century.

The Choke Cherry is a handsome plant when it is covered with its abundant racemes of pure white flowers; but it is generally disfigured by the Black Knot, which makes it a dangerous neighbor to orchards of cultivated Plum-trees.

[1] Richardson, *Arctic Searching Exped.* ii. 190.

[2] "The Cherrie trees yeeld great store of Cherries, which grow on clusters like grapes; they be much smaller than our *English* Cherrie, nothing neare so good if they be not very ripe; they so furre the mouth that the tongue will cleave to the roofe, and the throate wax horse with swallowing those red Bullies (as I may call them), being little better in taste. English ordering may bring them to be an English Cherrie, but yet they are as wilde as the Indians." (Wood, *New England's Prospect*, pt. i. chap. 5, 18.)

EXPLANATION OF THE PLATE.

PLATE CLVIII. PRUNUS VIRGINIANA (FROM OREGON).

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. Vertical section of a fruit, enlarged.
5. A stone, enlarged.
6. Part of a leafy branch with stipules, natural size.
7. A winter branchlet, natural size.

7

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C.E. Faxon del.

Picart fr. sc.

PRUNUS VIRGINIANA, L.

A. Riocreux direx.t

Imp. R. Taneur, Paris.

PRUNUS SEROTINA.

Rum Cherry. Wild Black Cherry.

CALYX-LOBES persistent. Stone oblong-obovate. Leaves oblong to lanceolate-oblong, usually gradually acuminate.

Prunus serotina, Ehrhart, *Beitr.* iii. 20. — Willdenow, *Berl. Baumz.* 239, t. 5, f. 2; *Spec.* ii. pt. ii. 986; *Enum.* 517. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 531. — Persoon, *Syn.* ii. 34. — Desfontaines, *Hist. Arb.* ii. 204. — Nuttall, *Gen.* i. 302. — W. P. C. Barton, *Compend. Fl. Phil.* i. 222. — Guimpel, Otto & Hayne, *Abbild. Holz.* 45, t. 37. — Hayne, *Dendr. Fl.* 70. — Sprengel, *Syst.* ii. 478. — Dietrich, *Syn.* iii. 43. — Curtis, *Rep. Geolog. Surv. N. Car.* 1860, iii. 56. — Chapman, *Fl.* 120. — Koch, *Dendr.* i. 122. — Emerson, *Trees Mass.* ed. 2, ii. 515, t. — Ridgway, *Proc. U. S. Nat. Mus.* 1882, 66. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 68. — Watson & Coulter, *Gray's Man.* ed. 6, 152.

Prunus Virginiana, Miller, *Dict.* ed. 8, No. 3 (not Linnæus). — Du Roi, *Obs. Bot.* 12; *Harbk. Baumz.* ii. 191. — Wangenheim, *Nordam. Holz.* 34, t. 14. — Medicus, *Bot. Beob.* 1782, 345. — Marshall, *Arbust. Am.* 112. — Aiton, *Hort. Kew.* ii. 163. — Walter, *Fl. Car.* 146. — Poiret, *Lam. Dict.* v. 664. — Pursh, *Fl. Am. Sept.* i. 329. — Bigelow, *Fl. Boston.* 118. — Elliott, *Sk.* i. 540. — Torrey, *Fl. U. S.* 467.

Cerasus Virginiana, Michaux, *Fl. Bor.-Am.* i. 285. — Michaux f. *Hist. Arb. Am.* iii. 151, t. 6. — Darlington, *Fl. Cestr.* 61. — Hooker, *Fl. Bor.-Am.* i. 169 (excl. syn.). — Don, *Gen. Syst.* ii. 515. — Loudon, *Arb. Brit.* ii. 710, f. 418.

Cerasus serotina, Loiseleur, *Nouveau Duhamel*, v. 3. — De Candolle, *Prodr.* ii. 540. — Spach, *Hist. Vég.* i. 416. — Torrey & Gray, *Fl. N. Am.* i. 410. — Loudon, *Arb. Brit.* ii. 712, f. 419. — Torrey, *Fl. N. Y.* i. 196. — Emerson, *Trees Mass.* 453. — Gray, *Man.* 115; *Forest Trees N. Am.* t. 50. — Darlington, *Fl. Cestr.* ed. 3, 75.

Prunus cartilaginea, Lehmann, *Ind. Sem. Hamb.* 1833.

Padus serotina, Agardh, *Theor. Syst. Pl.* t. 14, f. 8.

Padus Virginiana, Roemer, *Fam. Nat. Syn.* iii. 86.

Padus cartilaginea, Roemer, *Fam. Nat. Syn.* iii. 86.

A tree, with bitter aromatic bark and leaves, sometimes attaining a height of one hundred feet, with a stout straight trunk four to five feet in diameter, and small horizontal branches which form a narrow oblong head; usually much smaller and occasionally, toward the northern limit of its range, of shrub-like habit. On fully grown trunks the bark varies from one half to three quarters of an inch in thickness and is broken by reticulated fissures into small irregular plates, the surface of which splits into thin persistent scales; it is dark red-brown, or in southern Florida and the coast region of the Gulf states is light gray. The branches are slender and rather rigid, and at first are pale green or bronze-green and glabrous; they soon turn bright red or dark brown tinged with red, and in their first winter are red-brown or gray-brown and marked by minute pale lenticels. In the second year the thin tough layer of outer bark is bright red and more conspicuously marked, and may be separated readily in horizontal bands from the brilliant green inner layer. The winter-buds are obtuse or on sterile shoots acute, and are covered with bright chestnut-brown broadly ovate scales keeled on the back and apiculate at the apex; those of the inner ranks are persistent on the growing shoots scarious at maturity, acuminate, and from one half to two thirds of an inch in length. The leaves are oval, oblong, or lanceolate-oblong, gradually or sometimes abruptly acuminate, or rarely rounded at the apex, wedge-shaped, or occasionally rounded at the base, finely serrate with appressed incurved callose teeth, and furnished at the very base of the blade or at the apex of the slender terete petioles with one or more dark red conspicuous glands; while young they are slightly bearded along the midribs on the lower surface, and are often bronze-green, and at maturity they are glabrous, subcoriaceous, dark green, and lustrous on the upper, and paler on the lower surface, two to five inches long, and an inch to an inch and half broad, with narrow conspicuous midribs deeply grooved on the upper side, and slender veins. The stipules are lanceolate, acuminate, glandular-serrate, from one half to three fourths of an inch in length, and early deciduous. In autumn the leaves turn clear bright yellow before falling. The flowers, which are

produced on slender glabrous or puberulous pedicels developed from the axils of minute scarious caducous bracts, are borne in erect or ultimately spreading narrow many-flowered racemes, four to six inches in length, and appear when the leaves are about half grown, from the end of March in Texas and Louisiana to the first week of June in the valley of the St. Lawrence River. They are a quarter of an inch across when expanded, with a cup-shaped glabrous or puberulous calyx-tube and short ovate-oblong obtuse lobes, slightly laciniate on the margins, reflexed at maturity, and persistent with the stamens until after the falling of the fruit, pure white, broadly obovate petals, glabrous filaments and pistil, and a thick club-shaped stigma. The fruit, which ripens from June to October, is depressed-globular, slightly lobed, from one third to one half of an inch in diameter, dark red when first fully grown and almost black when ripe, with a thick skin, dark purple juicy flesh of a pleasant vinous flavor, and oblong-obovate pointed thin-walled stones broadly ridged on the ventral margin and acute on the other.

Prunus serotina is distributed from Nova Scotia westward through the Canadian Provinces to the valley of the Kaministiquia River,[1] southward through the eastern states to the shores of Matanzas Inlet and Tampa Bay, Florida, and westward to the valley of the Missouri River in Dakota, eastern Nebraska and Kansas, the Indian Territory and eastern Texas, along the mountain ranges of western Texas, southern New Mexico, and Arizona, and on those of Mexico and the Pacific regions of Central America, Colombia, and Peru. In the United States *Prunus serotina* grows usually in rich moist soil, and was once common in all the Appalachian region, where, associated with the White Oak, the White Ash, the Blue Ash, the Sugar Maple, the Yellow Buckeye, the Hickories, and the Black Birch, it was an important element of the forest, reaching its greatest size and beauty on the slopes of the high Alleghany Mountains from West Virginia to Georgia and Alabama; sometimes it grows on light sandy soil, and it may be found on the rocky cliffs of the New England coast within reach of the spray of the ocean; in the coast region of the southern states it is nowhere common, and does not attain a large size; and in the southwest it is confined to the bottoms of mountain cañons, at elevations between five thousand and seven thousand feet about the level of the sea, and rarely grows to a greater height than twenty or thirty feet.[2]

Prunus serotina is one of the most valuable timber trees of the American forests. The wood is light, strong, and rather hard, with a close straight grain and a satiny surface susceptible of receiving a beautiful polish; it is light brown or red, with thin yellow sapwood composed of ten or twelve layers of

[1] Brunet, *Cat. Pl. Can.* 43. — Delamare, Renauld & Cardot, *Fl. Miquelon.* 18. — Macoun, *Cat. Can. Pl.* i. 126, 513.

[2] Botanists have usually considered the Mexican Cherry-tree a distinct species, but it is impossible to find essential characters to distinguish it from the northern species with which it is connected geographically through Arizona, New Mexico, and Texas. The leaves of the Mexican tree are often narrowly lanceolate and acuminate, but this character is by no means constant, and leaves of a similar form are not uncommon on northern trees. The persistent calyx-lobes which distinguish *Prunus serotina* from the other species of the section Padus are found on the southern as well as on the northern trees. The synonymy of the Mexican Cherry-tree is as follows: —

Prunus salicifolia, Humboldt, Bonpland & Kunth, *Nov. Gen. et Spec.* vi. 241, t. 563. — Kunth, *Syn. Pl. Æquin.* iii. 481. — Sprengel, *Syst.* ii. 478. — Hemsley, *Bot. Biol. Am. Cent.* i. 368.

Cerasus Capollin, De Candolle, *Prodr.* ii. 539. — Don, *Gen. Syst.* ii. 515. — Loudon, *Arb. Brit.* ii. 713, f. 420. — Bentham, *Pl. Hartweg.* 10. — Torrey & Gray, *Fl. N. Am.* i. 412. — Gray, *Smithsonian Contrib.* v. 54 (*Pl. Wright.* ii.).

Cerasus salicifolia, De Candolle, *Prodr.* ii. 540. — Spach, *Hist. Vég.* i. 422. — Don, *Gen. Syst.* ii. 516.

Cerasus Capuli, Seringe; De Candolle, *Prodr.* ii. 541. — Don, *Gen. Syst.* ii. 516. — Spach, *Hist. Vég.* i. 422.

Prunus Capuli, Cavanilles; Sprengel, *Syst.* ii. 477. — Schlechtendal, *Linnæa*, xiii. 89, 404. — Koch, *Dendr.* i. 123. — Hemsley, *Bot. Biol. Am. Cent.* i. 367. — Watson, *Proc. Am. Acad.* xvii. 352.

Prunus Capulin, Zuccarini, *Abhand. Akad. Münch.* ii. 345, t. 8. — Roemer, *Fam. Nat. Syn.* iii. 87. — Torrey, *Bot. Mex. Bound. Surv.* 62. — Rusby, *Bull. Torrey Bot. Club*, ix. 53.

Prunus Canadensis, Mocino & Sessé, *Pl. Mex. Icon.* ined.

Laurocerasus salicifolia, Roemer, *Fam. Nat. Syn.* iii. 89.

Prunus salicifolia, var. *acutifolia*, Watson, *Proc. Am. Acad.* xxii. 411.

As is generally the case with individual trees grown in dry climates, the wood of the New Mexican Cherry is considerably heavier than the average of several specimens from trees which had grown in other parts of the United States, the specific gravity of the absolutely dry wood being 0.7879, and a cubic foot weighing 49.10 pounds. The Mexican Cherry is supposed to be an inhabitant of French gardens (*Rev. Hort.* 1884, 111; 1891, 62, f. 19, 20; 196. — Lavallée, *Arb. Segrez.* 115, t. 34), but as the plants which resemble in every respect the Wild Cherries of the east are perfectly hardy in the neighborhood of Paris and in the Arnold Arboretum, which received them from France, they are probably of more northern origin than the French horticulturists believe. In the elevated regions of western South America the Mexican Cherry is occasionally planted as a fruit-tree in the neighborhood of dwellings (Ed. André, *L'Amérique Equinoxiale* [*Le Tour du Monde*, xxxiv. 46]).

annual growth, but grows darker with exposure to the air. The specific gravity of the absolutely dry wood is 0.5822, a cubic foot weighing 36.28 pounds; the wood of no other North American tree is better colored or more valuable for cabinet-making and the fine interior finish of houses, and the great demand for it for these purposes has caused the destruction of the largest and best trees in all parts of the country.

The bark of the Wild Cherry, which contains the bitter principle [1] peculiar to plants of this genus, yields hydrocyanic acid when steeped in cold water, and, especially that of the branches and roots, is much employed in medicine for infusions, syrups, and fluid extracts, which are used as tonics and sedatives in the treatment of pulmonary consumption and nervous debility.[2] The ripe fruit is used domestically to flavor alcoholic liquors; and under the name of capulinos it is sold in the markets of Mexico and Central America, where it is eaten fresh or preserved, and is fermented and manufactured into a liquor similar to kirschwasser.[3]

The records of several early voyagers to the New World mention the Wild Cherry,[4] and, being established in English gardens before 1629, as John Parkinson records in his *Paradisi in Sole Paradisus terrestris*, it was one of the first American trees cultivated in Europe.[5]

With its tall massive trunk, lustrous foliage, abundant and graceful inflorescence, and handsome fruit, the Wild Cherry is one of the stateliest and most beautiful trees of the eastern woods; and its hardiness and ability to thrive under varied climatic conditions and in different soils, its rapid growth, and the value of the timber it produces, commend it to the attention of the planters of forests.[6]

[1] Procter, *Am. Jour. Pharm.* iv. 197. — Perot, *Am. Jour. Pharm.* xxiv. 750.

[2] B. S. Barton, *Coll.* ed. 3, 11, pt. ii. 51. — Griffith, *Med. Bot.* 288. — Carson, *Med. Bot.* i. 41, t. 35. — Bentley, *Pharm. Jour.* v. 97. — Gobley, *Jour. Pharm. et Chim.* xv. 40. — Guibourt, *Hist. Drog.* ed. 7. iii. 317. — Flückiger & Hanbury, *Pharmacographia*, 224. — *U. S. Dispens.* ed. 14, 749. — *Nat. Dispens.* ed. 2, 1177. — Bentley & Trimen, *Med. Pl.* ii. 97, t. 97. — Laurence Johnson, *Man. Med. Bot. N. A.* 135, f. 122. — Maisch, *Organic Mat. Med.* ed. 4, 184.

[3] Hamelin, *Rev. Hort.* 1884, 111.

[4] "It naturally yeelds mulberry-trees, cherry-trees, vines aboundance; goosberyes, strawberyes, hurtleberyes, respesses." (*A Relatyon of the discovery of our river from James Forte into the Maine; made by Capt. Christopher Newport, and seveerely written and observed by a gentleman of the colony. Archæologia Americana*, iv. 61 [1607].)

De Capolin, seu Ceraso dulci Indica, Francisco Hernandez, *Hist. Pl. Nov. Hisp.* ed. Madrid, 1790, ii. lib. vi. cap. lxxviii.

De Capolin seu ceraso dulci, Nieremberg, *Hist. Nat.* lib. xv. cap. xxi. 343 (cum icone, p. 344).

"The indigenous fruits consist . . . of mulberries, plums, but not many, medlars, wild cherries." (*Representation from New-Nether-Land, concerning the Situation, Fruitfulness, and poor Condition of the same.* English ed. Henry C. Murphy, 15.)

"*Wild Cherry*, they grow in clusters like Grapes, of the same bigness, blackish red when ripe, and of a harsh taste." (Josselyn, *New England's Rarities*, 61.)

[5] *Laurea Cerasus, sive laurus Virginiana*, the Virginian Bay or Cherry Bay, 599, t., f. 6.

Cerasus racemosa, foliis Amygdalinis, Americana, Plukenet, *Phyt.* t. 158, f. 4; *Alm. Bot.* 95.

Cerasus sylvestris, fructu nigricante in racemis longis pendulis Phytolaccæ instar congestis, Clayton, *Fl. Virgin.* 54. — Royen, *Fl. Leyd. Prodr.* 537. — Duhamel, *Traité des Arbres*, i. 148.

[6] Sargent, *Rep. Sec. Board Agric. Mass.* xxv. 269. — Naudin, *Manuel de l'Acclimateur*, 198.

EXPLANATION OF THE PLATE.

Plate CLIX. Prunus serotina.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. Vertical section of a fruit, enlarged.
5. Cross section of a fruit, enlarged.
6. A stone, enlarged.
7. Portion of a leafy branch showing stipules, natural size.
8. A winter branchlet, natural size.

C.E.Faxon del. Picart fr. sc.

PRUNUS SEROTINA, Ehrh.

A.Riocreux direx.t Imp. R. Taneur, Paris.

PRUNUS CAROLINIANA.

Wild Orange. Mock Orange.

CALYX-LOBES rounded at the apex, with undulate margins. Stone broadly ovate, cylindrical. Leaves oblong-lanceolate, entire or rarely remotely spinulose-serrate.

Prunus Caroliniana, Aiton, *Hort. Kew.* ii. 163. — Willdenow, *Spec.* ii. pt. ii. 987. — Poiret, *Lam. Dict.* v. 667. — Persoon, *Syn.* ii. 34. — Desfontaines, *Hist. Arb.* ii. 203. — Nuttall, *Gen.* i. 302. — Sprengel, *Neue Entd.* i. 304; *Syst.* ii. 478. — Hayne, *Dendr. Fl.* 71. — Elliott, *Sk.* i. 540. — Audubon, *Birds*, t. 159, 190. — Schlechtendal, *Linnæa*, xiii. 89. — Dietrich, *Syn.* iii. 43. — Chapman, *Fl.* 120. — Curtis, *Rep. Geolog. Surv. N. Car.* 1860, iii. 57. — Koch, *Dendr.* i. 124. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 69.

Padus Caroliniana, Miller, *Dict.* ed. 8, No. 6.

Padus Carolina, Du Roi, *Harbk. Baumz.* ii. 198.

Prunus-Lauro-Cerasus serratifolia, Marshall, *Arbust. Am.* 114.

Prunus Lusitanica, Walter, *Fl. Car.* 146 (not Linnæus).

Prunus Lusitanica, var. serratifolia, Castiglioni, *Viag. negli Stati Uniti*, ii. 340.

Cerasus Caroliniana, Michaux, *Fl. Bor.-Am.* i. 285. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 532. — *Nouveau Duhamel*, v. 5. — Michaux, *Hist. Arb. Am.* iii. 156, t. 7. — De Candolle, *Prodr.* ii. 540. — Don, *Gen. Syst.* ii. 516. — Spach, *Hist. Vég.* i. 420. — Loudon, *Arb. Brit.* ii. 720, f. 423. — Torrey & Gray, *Fl. N. Am.* i. 411.

Prunus sempervirens, Willdenow, *Enum.* Suppl. 33.

? Bumelia serrata, Pursh, *Fl. Am. Sept.* i. 155. — Roemer & Schultes, *Syst.* iv. 498.

? Achras serrata, Poiret, *Lam. Dict.* Suppl. v. 36.

Chimanthus amygdalina, Rafinesque, *Fl. Ludovic.* 26.

Laurocerasus Caroliniana, Roemer, *Fam. Nat. Syn.* iii. 90.

A tree, thirty to forty feet in height, with a straight or inclining trunk sometimes ten or twelve inches in diameter, and small horizontal branches forming a rather narrow oblong or sometimes a broadly spreading head. The bark of the trunk is an eighth of an inch thick, and smooth or slightly roughened by narrow longitudinal ridges, and is gray, with large irregular dark blotches. The branches are glabrous and marked by occasional pale lenticels, slightly angled, at first light green, then bright red, and in their second season light brown or gray. The buds are acuminate, an eighth of an inch long, and covered with narrow-pointed dark chestnut-brown scales rounded on the back. The leaves, which are persistent on the branches until their second year, are oblong-lanceolate, acuminate and mucronate, with entire thickened slightly revolute margins, or are rarely remotely spinulose-serrate; they are glabrous, coriaceous, and obscurely veined, with narrow pale midribs deeply grooved on the upper side, dark green and lustrous on the upper, and paler on the lower surface, two to four and a half inches long, and three quarters of an inch to an inch and a half broad, and are borne on stout broad orange-colored channeled petioles. The stipules are foliaceous, lanceolate-acuminate, and early deciduous. The flowers appear from February to April and are produced, in dense racemes shorter than the leaves, on slender club-shaped pedicels from the axils of long acuminate scarious red-tipped bracts; these mostly fall some time before the opening of the flowers, which are cream-colored, and have a narrow obconic calyx-tube with small thin rounded deciduous lobes undulate on the margins and reflexed after anthesis, minute erect boat-shaped petals, exserted orange-colored stamens with glabrous filaments, large pale anthers, and a glabrous pistil and club-shaped stigma. The fruit ripens in the autumn and remains on the branches until after the flowering period of the following year; it is oblong, short-pointed, black, and lustrous, and half an inch long, with a thick skin, thin dry flesh, and a broadly ovate pointed cylindrical stone which has an obscure or rudimentary ridge on the ventral margin, and thin fragile walls. The coat of the seed is thin and papery and dark red-brown like the cotyledons which inclose the short radicle.

Prunus Caroliniana inhabits the southern coast region, and is distributed from the valley of the

Cape Fear River to the shores of Bay Biscayne and the valley of the Kissimmee River in Florida, and through southern Alabama, Missouri, and Louisiana to the valley of the Guadaloupe River in Texas. It grows in deep rich humid bottom-lands, reaching its greatest size in the valleys of eastern Texas, where it often forms nearly impenetrable thickets of considerable size; in the eastern Gulf and Atlantic states it is nowhere common and is confined to the islands and the immediate neighborhood of the sea, rarely penetrating inland more than fifteen or twenty miles.

The wood of *Prunus Caroliniana* is heavy, hard, strong, and close-grained; it is light red-brown or sometimes rich dark brown, with thick lighter colored sapwood, a satiny surface susceptible of receiving a beautiful polish, and many thin medullary rays. The specific gravity of the absolutely dry wood is 0.8688, a cubic foot weighing 54.14 pounds.

Prunus Caroliniana contains hydrocyanic acid in considerable quantities, and the partially withered leaves and young branches have proved fatal to animals browsing upon them.[1]

Prunus Caroliniana was first described by Mark Catesby in his *Natural History of Carolina*,[2] published in 1731, and was first cultivated in Europe in the Physic Garden at Chelsea by Philip Miller, who received it from Catesby in 1759.[3]

The beauty of the foliage[4] of the Mock Orange, its early and abundant flowers, and the rapidity of its growth, make it a favorite garden plant in the southern states, where it has been used from early times to decorate the neighborhood of dwellings, and to form hedges, for which purpose it is well adapted by its rigid leaves and its power of withstanding the effects of annual prunings.[5]

[1] Elliott, *Sk.* i. 540.

[2] *Ligustrum Lauri folio, fructu violaceo*, i. 61, t. 61.

Padus foliis lanceolatis acutè denticulatis sempervirentibus, Miller, *Dict.* ed. 7, No. 6.

[3] Aiton, *Hort. Kew.* ii. 163.

[4] "There is an evergreen sort of this Bird or Cluster-cherry which grows about 30 feet high in S. Carolina, and from the beauty of its evergreen shining leaves is called the Mock-orange; the fruit of this steeped in brandy makes a fine flavoured ratafie." (Stork, *An Account of East Florida*, *Bartram's Journal*, 9, note.)

[5] Porcher, *Resources of Southern Fields and Forests*, 171. — Naudin, *Manuel de l'Acclimateur*, 197.

EXPLANATION OF THE PLATE.

Plate CLX. Prunus Caroliniana.

1. A flowering and fruiting branch, natural size.
2. A flower, enlarged.
3. Vertical section of a flower, enlarged.
4. Vertical section of a fruit, natural size.
5. Cross section of a fruit, natural size.
6. An embryo, enlarged.
7. Vertical section of a portion of the embryo, showing the radicle, enlarged.
8. A stone, enlarged.
9. The inflorescence before anthesis, showing the bracts, natural size.
10. A spinulose-toothed leaf, natural size.

C.E.Faxon del. Picart fr. sc.

PRUNUS CAROLINIANA, Ait.

A.Riocreux direx.t Imp.R.Taneur, Paris.

PRUNUS SPHÆROCARPA.

CALYX-LOBES acute, with laciniate margins. Stone globose. Leaves elliptical to oblong-ovate, entire.

Prunus sphærocarpa, Swartz, *Prodr.* 81; *Fl. Ind. Occ.* ii. 927. — Willdenow, *Spec.* ii. pt. ii. 987. — Poiret, *Lam. Dict.* v. 666. — Persoon, *Syn.* ii. 34. — Lunan, *Hort. Jam.* ii. 276. — Don, *Gen. Syst.* ii. 516. — Dietrich, *Syn.* iii. 43. — Sprengel, *Syst.* ii. 478; iv. pt. ii. 406. — Schlechtendal, *Linnæa*, xiii. 87. — Walpers, *Rep.* ii. 10. — Grisebach, *Fl. Brit. W. Ind.* 231. — Hooker f. *Martius Fl. Brasil.* xiv. pt. ii. 55, t. 19. — Sauvalle, *Fl. Cub.* 36. — Chapman, *Fl.* ed. 2, Suppl. 620. — Sargent, *Forest Trees N. Am. 10th Census U. S.* ix. 70.

Cerasus sphærocarpa, Loiseleur, *Nouveau Duhamel*, v. 4. — De Candolle, *Prodr.* ii. 540. — Chamisso & Schlechtendal, *Linnæa*, ii. 542. — Loudon, *Arb. Brit.* ii. 721. — *Bot. Mag.* t. 3141. — Spach, *Hist. Vég.* i. 421.

Prunus Brasiliensis, Steudel, *Nom. Bot.*

Cerasus Brasiliensis, Chamisso & Schlechtendal, *Linnæa*, ii. 540.

Cerasus reflexa, Gardner, *Lond. Jour. Bot.* ii. 342.

Laurocerasus sphærocarpa, Roemer, *Fam. Nat. Syn.* iii. 89.

Laurocerasus sphærocarpa, *β.* **Brasiliensis**, Roemer, *Fam. Nat. Syn.* iii. 89.

Prunus pleuradenia, Grisebach, *Fl. Brit. W. Ind.* 231.

A small glabrous tree, in Florida rarely exceeding twenty-five to thirty feet in height, with a trunk five or six inches in diameter covered with thin smooth or slightly reticulate-fissured light brown bark tinged with red, and slender upright branches and branchlets. These, when they first appear, are orange-brown but become ashy gray or light brown tinged with red, and are covered with small circular pale lenticels. The leaves are elliptical to oblong-ovate, gradually or abruptly contracted into broad obtuse points or less commonly rounded or rarely emarginate at the apex, wedge-shaped at the base, entire, with slightly thickened undulate margins, eglandular, obscurely veined, with narrow midribs deeply grooved on the upper side; they are persistent, subcoriaceous, yellow-green and lustrous on the upper, and paler on the lower surface, two to four and a half inches long and an inch to an inch and a half broad, and are borne on slender orange-brown petioles which vary from one half of an inch to nearly an inch in length. The stipules are foliaceous, lanceolate-acuminate, entire, a quarter of an inch long, and early deciduous. The flowers are produced in slender many-flowered racemes shorter than the leaves and ebracteolate at the flowering period, and in Florida appear in November; they are one eighth of an inch across and are borne on slender orange-colored pedicels which stand remotely on the rachis and vary from one fourth to two thirds of an inch in length. The calyx-tube is obconic, bright orange-colored on the outer surface, and marked by an orange band in the throat, with thin minute acute deciduous lobes laciniate on the margins and much shorter than the petals, which are obovate, rounded, or acuminate above, contracted below into short claws, and reflexed at maturity, and are white marked with yellow on the inner surface towards the base. The stamens are exserted, and have slender orange-colored subulate filaments and small yellow anthers. The ovary is ovoid and contracted into a short stout style crowned with a large club-shaped stigma. The fruit, which in Florida is produced very sparingly and ripens either in the spring or early summer, is subglobose to oblong, apiculate, orange-brown, and from one third to one half of an inch long, with thin dry flesh adherent to the thin-walled fragile stone which is obscurely ridged on the ventral edge. The seed is pointed at the apex, with a thin dark orange-colored testa and thick cotyledons inclosing the short radicle.

Prunus sphærocarpa is found in the United States only near the shore of Bay Biscayne, where, west of the Miami River on rich hummock-land, it grows as a slender tree in a dense forest principally composed of the Mastic, the Gumbo Limbo, the Pigeon Plum, and the Florida Fig-tree, and occasionally

on low ground near the borders of small streams and ponds. It is not rare in the West Indies, and is widely distributed through Brazil.

The wood of *Prunus sphærocarpa* is heavy, hard, and close-grained, with obscure medullary rays and numerous minute open ducts, and is light clear red, with thick pale sapwood. The specific gravity of the absolutely dry wood is 0.8998, a cubic foot weighing 56.08 pounds. The fruit is used in the West Indies in the preparation of a cordial.[1]

Prunus sphærocarpa was first found in Florida in 1877 by Dr. A. P. Garber.[2]

[1] *Bot. Mag.* t. 3141. — Rosenthal, *Syn. Pl. Diaphor.* 979.

[2] See i. 65.

EXPLANATION OF THE PLATE.

PLATE CLXI. PRUNUS SPHÆROCARPA.

1. A flowering branch, natural size.
2. Vertical section of a flower just expanded, enlarged.
3. A fruiting branch, natural size.
4. Vertical section of a fruit, enlarged.
5. A seed, enlarged.
6. Part of a young leafy shoot showing stipules, natural size.

C.E. Faxon del. Picart fr. sc.

PRUNUS SPHÆROCARPA, Sw.

A. Riocreux direx.t Imp. R. Taneur, Paris.

PRUNUS ILICIFOLIA.

Islay.

CALYX-LOBES acute, entire. Stone ovate, slightly compressed. Leaves ovate to lanceolate-acuminate, coarsely spinosely toothed or rarely entire.

Prunus ilicifolia, Walpers, *Rep.* ii. 10. — Dietrich, *Syn.* iii. 43. — Torrey, *Bot. Mex. Bound. Surv.* 63; *Bot. Wilkes Explor. Exped.* 285. — Brewer & Watson, *Bot. Cal.* i. 168; ii. 443. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 70. — Greene, *Fl. Francis.* 50.

Cerasus ilicifolia, Nuttall; Hooker & Arnott, *Bot. Voy. Beechey*, 340, t. 83. — Torrey & Gray, *Fl. N. Am.* i. 411. — Nuttall, *Sylva*, ii. 16, t. 47. — Torrey, *Emory's Rep.* 139; *Pacific R. R. Rep.* iv. 83. — Walpers, *Ann.* iv. 654. — Kellogg, *Proc. Cal. Acad.* ii. 22. — Bolander, *Proc. Cal. Acad.* iii. 79; iv. 22. — *The Garden*, iii. 131, f.

Laurocerasus ilicifolia, Roemer, *Fam. Nat. Syn.* iii. 92.

A glabrous tree, twenty to thirty feet in height, with a short trunk rarely attaining a diameter of two feet or rising to a greater height than ten or twelve feet, and stout spreading branches forming a dense compact head; usually much smaller, and often a shrub with stems sometimes only a foot or two in length. The bark of the trunk, which varies from one third to one half of an inch in thickness, is dark red-brown, its surface divided by deep fissures into small square plates. The branchlets are at first yellow-green or orange-colored but soon become gray or reddish brown, and are more or less conspicuously marked by minute pale lenticels, and, in their second or third year, by the large leaf-scars left by the falling of the leaves. The buds are acuminate, with narrow dark red scales contracted into long slender points, those of the inner ranks being accrescent and persistent on the young shoots until these have obtained a length of several inches. The leaves are ovate to ovate-lanceolate, acute, rounded or emarginate at the apex, wedge-shaped and rounded or truncate at the base, and very obscurely veined, with thickened margins coarsely spinosely toothed, the stout teeth near the base of the leaf often tipped with large dark glands; they are thick and coriaceous, dark green and lustrous on the upper, and paler and yellow-green on the lower surface, an inch to two and a half inches long, and an inch to an inch and a half broad, with slender yellow midribs grooved on the upper side; they are borne on broad channeled petioles from one eighth to one half of an inch in length, and fall during their second summer. The stipules are acuminate, obscurely denticulate, a quarter of an inch long, and early deciduous. The flowers, which are produced in slender racemes an inch and a half to three inches in length, on short slender pedicels developed from the axils of acuminate scarious bracts a quarter of an inch in length and mostly deciduous before the opening of the flower-buds, are a third of an inch across and appear from March to May. The calyx-tube is cup-shaped and orange-brown, with minute acuminate deciduous lobes reflexed at maturity and about one third as long as the obovate white petals which are rounded above and narrowed below into short claws. The stamens are slightly exserted, with slender incurved filaments which taper from below upwards, and minute yellow anthers. The ovary is glabrous and abruptly contracted into a slender style usually bent near the summit at a right angle, or rarely erect, and surmounted with a large orbicular stigma. The fruit, which ripens in November and December, is subglobose, often compressed, from one half to two thirds of an inch in diameter, dark red when first fully grown, and purple or sometimes nearly black at maturity; the flesh is thin, with a slightly acid astringent and agreeable flavor, and is easily separable from the stone. This is ovate, slightly compressed, pointed at the apex, light yellow-brown, and conspicuously marked with reticulate orange-colored vein-like lines, with three broad orange bands radiating from the base to the apex along one suture, and with a single narrow band along the other suture; the walls are thin and brittle and are composed of two distinct coats, the inner being light yellow and lustrous on the

interior surface. The seed coat is thin and papery, light brown, and conspicuously marked with broad darker colored veins; the cotyledons are orange-brown and inclose the short radicle.

A form, *Prunus ilicifolia*, var. *integrifolia*,[1] common on some of the islands off the coast of California and not rare on the mainland, has entire or occasionally spinose-serrate ovate-acuminate or lanceolate-acuminate, or sometimes broadly ovate and abruptly acute leaves, apiculate at the apex, wedge-shaped, rounded, or truncate at the base, two to three inches long, and from half an inch to two and a half inches broad, and produces rather larger fruit than the more common form with spinosely toothed leaves.

Prunus ilicifolia is distributed from the shores of the Bay of San Francisco southward through the coast ranges to the San Julio cañon in Lower California,[2] and it occurs on the western slopes and foothills of the San Bernardino, and on Santa Cruz and Santa Rosa Islands. It grows as a low shrub on dry hillsides and mesas, or as a tree near streams in the bottoms of cañons in moist sandy soil, reaching its greatest size in those of the Santa Inez Mountains near Santa Barbara, on the islands, and in Lower California.

The wood of *Prunus ilicifolia* is heavy, hard, strong, and close-grained, with a satiny surface susceptible of receiving a beautiful polish. It contains numerous medullary rays and many regularly distributed small open ducts, and is light red-brown, with thin lighter colored sapwood composed of eight or ten layers of annual growth. The specific gravity of the absolutely dry wood is 0.9803, a cubic foot weighing 61.09 pounds.[3] It is sometimes used for fuel, and might be employed in cabinet-making.

Prunus ilicifolia appears to have been first noticed by David Douglas[4] who discovered it on the mountains near Monterey; it was next found by Thomas Nuttall,[5] whose description is the earliest that was published. It was introduced into Europe many years ago, and is now occasionally seen in the gardens of southern Europe,[6] where it flowers and produces fruit abundantly, and in California is sometimes cultivated as an ornamental plant and for hedges.[7]

Few of the broad-leaved evergreens of North America are more beautiful than the Islay,[8] or are better suited to adorn a garden in those parts of the world where the climate permits it to display all the beauties of its abundant lustrous foliage, its showy racemes of flowers, and its handsome fruit. Its rapid growth when planted in good soil,[9] the vigor which enables it to withstand the effects of annual cutting, and its spinescent rigid foliage, make it a useful and interesting hedge plant.[10]

[1] *Prunus ilicifolia*, var. *integrifolia*, Sudworth, *Garden and Forest*, iv. 51.

Prunus occidentalis, W. S. Lyon, *Bot. Gazette*, xi. 202, 333 (not Swartz). — Greene, *Bull. Cal. Acad.* ii. 395.

Prunus ilicifolia, var. *occidentalis*, T. S. Brandegee, *Proc. Cal. Acad.* ser. 2, i. 209. — Sargent, *Garden and Forest*, ii. 400.

[2] Mr. T. S. Brandegee found the entire-leaved form of *Prunus ilicifolia* growing in the San Julio cañon at the southern limit of its known range in a tree-like form with trunks more than a foot in diameter (*l. c.* ii. 121 [*Pl. Baja Cal.*]).

[3] The absolutely dry wood of a log of the entire-leaved form in the Jesup Collection of North American Woods in the American Museum of Natural History in New York, collected by Mr. T. S. Brandegee on Santa Cruz Island, has a specific gravity of 0.7997, a cubic foot weighing 49.84 pounds (*Garden and Forest*, iii. 344).

[4] See ii. 94.

[5] See ii. 34.

[6] I find no record of the date of introduction of *Prunus ilicifolia* into Europe, or of the name of the first person who cultivated it there. In 1850 it was seen by Herincq in the nurseries of Thibaut & Ketelêer near Paris (*Rev. Hort.* 1850, 246), and five years later it was included in the list of plants which perished in the garden of the Muséum d'Histoire Naturelle in Paris during the severe winter of 1854–55 (*Rev. Hort.* 1855, 313). It had been introduced into England before 1853 by the Royal Horticultural Society (Paxton, *Brit. Fl. Gard.* iii. 44, f. 254).

[7] The early Spanish settlers in California appreciated the beauty of *Prunus ilicifolia*, and frequently used it to decorate their gardens; and in those of some of the old missions, fine specimens, probably a hundred years old, testify to its value as an ornamental plant.

[8] *Prunus ilicifolia* is also known in California as the Spanish Wild Cherry and the Mountain Evergreen Cherry.

[9] Plants in the nurseries of the Leland Stanford, Jr. University in Santa Clara County, California, which are only three years old, are eighteen feet high with heads fifteen feet in diameter.

[10] Nicholson, *Dict. Gard.* f. 403, A. (as *Cerasus*). — Naudin, *Manuel de l'Acclimateur*, 445 (as *Pygeum*).

EXPLANATION OF THE PLATES.

Plate CLXII. Prunus ilicifolia.

1. A flowering branch, natural size.
2. Vertical section of a flower just expanded, enlarged.
3. A fruiting branch, natural size.
4. Vertical section of a fruit, natural size.
5. A stone, natural size.
6. An embryo, natural size.

Plate CLXIII. Prunus ilicifolia, *var.* integrifolia.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. Vertical section of a fruit, natural size.

5 and 6. Leaves, showing variation.

C.E.Faxon del. Picart fr. sc.

PRUNUS ILICIFOLIA, Walp.

A.Riocreux direx.t Imp. R.Taneur, Paris.

C.E. Faxon del. Picart fr. sc.

PRUNUS ILICIFOLIA, Var. INTEGRIFOLIA, Sudworth.

A. Riocreux direx.t Imp. R. Taneur, Paris.

VAUQUELINIA.

FLOWERS regular, perfect; calyx 5-lobed, the lobes valvate in æstivation; petals 5, imbricated in æstivation; stamens 15 to 25; carpels 5, united into a 5-celled ovary; ovules 2 in each cell, ascending. Fruit a dry 5-celled woody capsule. Leaves simple.

Vauquelinia, Correa; Humboldt & Bonpland, *Pl. Æquin.* i. 140. — Meisner, *Gen.* 103. — Endlicher, *Gen.* 1249. — Bentham & Hooker, *Gen.* i. 615. — Baillon, *Hist. Pl.* i. 472.

Small trees or shrubs, with slender terete branches and scaly bark. Leaves alternate or rarely opposite, lanceolate, serrate, long-petiolate, reticulate-veined, coriaceous, persistent; stipules minute, deciduous. Flowers white, in compound terminal corymbs, the lower branches of the inflorescence from the axils of leaves, the upper from those of minute deciduous bracts. Pedicels slender, bibracteolate. Calyx shortly turbinate, coriaceous, persistent, five-lobed, the lobes ovate, obtuse or acute, erect. Disk connate to and lining the tube of the calyx, glandular. Petals five, inserted in the mouth of the calyx, orbicular or oblong, reflexed at maturity, persistent. Stamens fifteen to twenty-five, inserted on the margin of the disk in three or four proximate rows, equal or subequal, those of the outer row parapetalous, those of the next alternate with them and with those of the other rows; filaments subulate, those of the outer row rather thicker at the base than the others, exserted, persistent; anthers attached on the back near the middle, versatile, extrorse, two-celled, the cells opening longitudinally. Carpels five, opposite the sepals, inserted on the thickened base of the calyx-tube, united below into a five-celled ovoid ovary coated with tomentum and crowned by five short spreading styles with dilated capitate stigmas; ovules two in each cell, subbasilar, ascending, collateral, anatropous, two-coated, prolonged at the apex into thin membranaceous wings; raphe ventral, micropyle superior. Fruit a woody ovoid five-celled tomentose capsule inclosed at the base by the remnants of the flower and separating at maturity into five nutlets adherent below, tipped with the remnants of the styles, and at maturity splitting longitudinally down the back. Seeds two in each cell, ascending, compressed, exalbuminous; testa membranaceous, expanded at the apex into a long membranaceous wing. Embryo filling the cavity of the seed; cotyledons flat; radicle straight, erect.

Vauquelinia is confined to the New World, where it inhabits southern Mexico, northern Mexico, Arizona, and Lower California. Three species are distinguished. The type of the genus, *Vauquelinia corymbosa*,[1] is a small tree widely distributed from the mountains of Oaxaca to those of Coahuila and Chihuahua; *Vauquelinia Karwinskyi*,[2] described as a shrub, inhabits southern Mexico, and *Vauquelinia Californica* the mountain ranges of southern Arizona and the adjacent portions of Sonora and Lower California. The genus is not known to possess properties useful to man.

The generic name commemorates the scientific labors of the distinguished French chemist, Louis Nicolas Vauquelin.[3]

[1] Correa; Humboldt & Bonpland, *Pl. Æquin.* i. 140, t. 40. — Humboldt, Bonpland & Kunth, *Nov. Gen. et Spec.* vi. 238. — Kunth, *Syn. Pl. Æquin.* iii. 479. — Baillon, *Hist. Pl.* i. 398, f. 452–455. — Maximowicz, *Act. Hort. Petrop.* vi. 236 (*Adnot. Spiræaceis*, 132). — Hemsley, *Bot. Biol. Am. Cent.* i. 370. — Pringle, *Garden and Forest*, i. 524.

[2] Maximowicz, *l. c.*

[3] Louis Nicolas Vauquelin (1763–1829); a native of Saint-André-des-Berteaux, after a youth of much privation, became the pupil and later the associate of Fourcroy, with whom he published the results of many of his early investigations and through whom he obtained the position of inspector of mines, and professorships in l'École des Mines, in l'École Polytechnique, and in the Collége de France. He became a member of the Institut de France, director of l'École de Pharmacie, professor of chemistry in the Muséum d'Histoire Naturelle, and a member of the Conseil des Arts et Manufactures. In addition to many papers printed in the Proceedings of learned societies, Vauquelin, who was regarded as one of the most distinguished experimenters in physics and chemistry of his time, published *Le Manuel d'Essayeur* and edited the *Dictionnaire de Chimie et de Métallurgie* which formed part of the *Encyclopédie Méthodique.*

VAUQUELINIA CALIFORNICA.

Leaves narrowly lanceolate, coated on the lower surface with white tomentum.

Vauquelinia Californica, Sargent, *Garden and Forest*, ii. 400.
Spiræa Californica, Torrey, *Emory's Rep.* 140.
Vauquelinia corymbosa, Torrey, *Bot. Mex. Bound. Surv.* 64 (not Correa).

Vauquelinia Torreyi, Watson, *Proc. Am. Acad.* xi. 147. — Brewer & Watson, *Bot. Cal.* i. 169. — Maximowicz, *Act. Hort. Petrop.* vi. 237 (*Adnot. Spiræaceis*, 133). — Hemsley, *Bot. Biol. Am. Cent.* i. 370. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 70.

A small tree, eighteen or twenty feet in height, with a slender often hollow trunk five or six inches in diameter, and rigid upright contorted branches; or more often a low shrub. The bark of the trunk is a sixteenth of an inch thick, with a dark red-brown surface broken into small thin square plate-like persistent scales. The branches are at first bright reddish brown and more or less thickly covered with pale tomentum; and in their second year are light brown or gray and marked with large elevated leaf-scars. The leaves are narrowly lanceolate, acuminate or rarely rounded at the apex, obliquely wedge-shaped or slightly rounded at the base, and remotely serrate with minute glandular teeth; when they unfold they are puberulous on the upper, and densely tomentose on the lower surface, and at maturity are coriaceous, bright yellow-green and glabrous on the upper, and tomentose, or late in the season puberulous, below; they are from an inch and a half to three inches long, and from one quarter to one half of an inch broad, with thick conspicuous midribs grooved on the upper side, and numerous thin primary veins connected by reticulate veinlets, and are borne on thick channeled petioles from one third to one half of an inch in length, and fall in spring or early summer. The stipules are minute, acute, and early deciduous. The flowers, which appear in June, are a quarter of an inch in diameter and are produced in great numbers in loose wide-branched panicles two or three inches across and coated with white tomentum; they vary from those of the type of the genus only in their slightly oblong petals and the pilose inner surface of the disk. The fruit, which is fully grown by the end of August, is then conspicuous on account of the contrast between the bright red faded petals and the white silky covering of the calyx and carpels; it is a quarter of an inch long, and remains on the branches after opening until the spring of the following year. The seed is a twelfth of an inch in length, or one third as long as the oblong wing.

Vauquelinia Californica inhabits the mountain ranges of southern Arizona and those of Sonora and Lower California,[1] but has not been seen with the habit of a tree except on the Santa Catalina Mountains of Arizona; here at an elevation of some five thousand feet above the level of the sea it reaches its largest size in rich granite soil baked by the direct rays of the sun, growing on the bottoms or rocky sides of gulches, or often on grassy slopes and chiefly associated with *Quercus grisea* and *Quercus oblongifolia;* and towards the base of these mountains is common in a shrubby form with *Celtis pallida*, *Fendlera rupicola*, *Fouquieria splendens*, and *Rhamnus Purshiana*.

The wood of *Vauquelinia Californica* is very heavy, hard, and close-grained, and is susceptible of receiving a beautiful polish. It contains numerous thin medullary rays, and is dark rich brown streaked with red, with thin yellow sapwood composed of fourteen or fifteen layers of annual growth. The specific gravity of the absolutely dry wood is 1.1374, a cubic foot weighing 70.88 pounds.[2]

Vauquelinia Californica was discovered in October, 1846, by a detachment of United States troops

[1] T. S. Brandegee, *Proc. Cal. Acad.* ser. 2, ii. 154 (*Pl. Baja Cal.*).

[2] The stems of *Vauquelinia Californica* increase very slowly in diameter as shown by the specimen in the Jesup Collection of North American Woods in the American Museum of Natural History in New York, which is only seven inches in diameter, with one hundred and four layers of annual growth.

under command of Colonel William H. Emory,[1] on one of the mountain ranges near the head-waters of the Gila River.

The snowy whiteness of the under surface of its leaves and the abundance of its flowers make *Vauquelinia Californica* an attractive and beautiful plant well worth a place in the gardens of all dry temperate regions.

[1] William Hemsley Emory (1811–1887) was born in Queen Anne County, Maryland, and was graduated from the military academy at West Point in 1831, when he was appointed a second lieutenant of artillery. He resigned from the army in 1836 in order to practice civil engineering, but two years later was reappointed with the grade of first lieutenant of topographical engineers. Emory served with distinction in California and in the Mexican War, and on the conclusion of peace was named astronomer to the commission for establishing the boundary between the United States and Mexico, and afterwards became a member of this commission. He fought gallantly in the War of the Rebellion and obtained the rank of major-general of volunteers. He is the author of *Notes of a Military Reconnoissance from Fort Leavenworth in Missouri to San Diego in California*, published in Washington in 1848; of *Notes of Travel in California*, published in New York in 1848, and of the *Report of the United States and Mexican Boundary Commission*, published in Washington in 1857.

Emorya, a shrub of New Mexico and Arizona, dedicated to him by Torrey, commemorates General Emory's active and intelligent interest in increasing the knowledge of plants, and connects his name with the scenes of his scientific labors.

EXPLANATION OF THE PLATE.

PLATE CLXIV. VAUQUELINIA CALIFORNICA.

1. A flowering branch, natural size.
2. Diagram of a flower
3. A flower, enlarged.
4. Vertical section of a flower, enlarged.
5. A stamen, enlarged.
6. A pistil, enlarged.
7. An ovule, much magnified.
8. A fruiting branch, natural size.
9. A fruit, enlarged.
10. A fruit, after the splitting open of the carpels, enlarged.
11. Vertical section of a fruit, enlarged.
12. A seed, enlarged.
13. An embryo, magnified.

C.E.Faxon del. *Picart fr. sc.*

VAUQUELINIA CALIFORNICA, Sarg.

A. Riocreux direx.t *Imp. R. Taneur, Paris.*

CERCOCARPUS.

FLOWERS perfect; calyx 5-lobed, the lobes imbricated in æstivation; petals 0; stamens 15 to 30; carpel 1 or rarely 2. Fruit a linear-oblong akene tipped with the accrescent persistent plumose style. Leaves alternate, simple, persistent.

Cercocarpus, Humboldt, Bonpland & Kunth, *Nov. Gen. et Spec.* vi. 232. — Meisner, *Gen.* 105. — Endlicher, *Gen.* 1245. — Bentham & Hooker, *Gen.* i. 618. — Baillon, *Hist. Pl.* i. 468.

Trees or shrubs, with scaly bark, rigid terete branches, short lateral spur-like branchlets, and hard heavy dark-colored wood. Buds minute, the scales of the inner rows accrescent on the growing shoots, often colored. Leaves alternate, simple, entire or serrate, coriaceous, straight-veined, short-petiolate, persistent; stipules minute, adnate to the base of the petiole, deciduous. Flowers sessile or short-pedicellate, solitary or fascicled, axillary or terminal. Calyx-tube cylindrical, long and pedicelliform, abruptly expanded at the apex into a cup-shaped five-lobed deciduous limb. Disk thin, slightly glandular, adnate to the tube of the calyx. Stamens inserted in two or three rows on the limb of the calyx, those of the outer row parasepalous and alternate with those of the inner rows; filaments incurved in the bud, free, short, terete; anthers oblong, usually pubescent, attached on the back, introrse, two-celled, the cells opening longitudinally, distinct, united by a broad connective. Ovary composed of a single carpel, inserted in the bottom and included in the tube of the calyx, acute, terete, smooth, striate or sulcate, sericeous; or rarely bicarpellate; style terminal, filiform, villose, or glabrate, crowned with a minute obtuse stigma; ovules solitary, subbasilar, ascending, anatropous; raphe dorsal, the micropyle inferior. Akene linear-oblong, coriaceous, slightly ridged, angled, or sulcate, included in the persistent tube of the calyx and surmounted by the long persistent plumose style, which in enlarging and lengthening raises the limb of the calyx now separated near the apex of the tube by a circumscissile line. Seeds solitary, linear-acute, erect, exalbuminous, the conspicuous hilum lateral above the oblique base; testa membranaceous. Embryo filling the cavity of the seed; cotyledons ovate-oblong, elongated, fleshy; radicle inferior.

Cercocarpus is confined to the dry interior and mountainous regions of North America. Three species can be distinguished. The type of the genus, *Cercocarpus fothergilloides*,[1] inhabits the mountains of southern Mexico; the others are small shrubby trees of the central and western parts of the United States and of northern Mexico. The wood of all the species makes valuable fuel, and is occasionally used in the manufacture of many small objects for domestic and industrial use.

The generic name, from κέρκος and καρπός, refers to the peculiar long-tailed fruit.

[1] Humboldt, Bonpland & Kunth, *Nov. Gen. et Spec.* vi. 233, t. 559. — Kunth, *Syn. Pl. Æquin.* iii. 475. — De Candolle, *Prodr.* ii. 589. — Baillon, *Hist. Pl.* i. 381, f. 436, 437. — Hemsley, *Bot. Biol. Am. Cent.* i. 373. — Engler & Prantl, *Pflanzenfam.* iii. 39, f. 17.

CONSPECTUS OF THE NORTH AMERICAN SPECIES.

Leaves narrowly linear, entire . . . . . 1. C. LEDIFOLIUS.
Leaves cuneate-obovate, coarsely glandular-serrate above the middle . . . . . 2. C. PARVIFOLIUS.

CERCOCARPUS LEDIFOLIUS.

Mountain Mahogany.

LEAVES narrowly lanceolate, entire.

Cercocarpus ledifolius, Nuttall; Torrey & Gray, *Fl. N. Am.* i. 427; *Sylva*, ii. 28, t. 51. — Hooker, *Icon.* iv. t. 324. — Walpers, *Rep.* ii. 46. — Dietrich, *Syn.* iii. 119. — Watson, *King's Rep.* v. 83, 420. — Parry, *Am. Nat.* ix. 201, 270; *Proc. Davenport Acad.* i. 146. — Brewer & Watson, *Bot. Cal.* i. 174. — Rothrock, *Wheeler's Rep.* vi. 43, 111, 360. — Sargent, *Forest Trees N. Am. 10th Census U. S.* ix. 71. — Coulter, *Man. Rocky Mt. Bot.* 80. — M. E. Jones, *Zoë*, ii. 244.

A resinous and slightly aromatic tree, rarely attaining a height of forty feet, with a short stout trunk occasionally two and a half feet in diameter, and stout spreading usually contorted branches forming a round compact head; generally much smaller, or often a low intricately branched shrub. The bark of the trunk of old individuals is an inch thick and is divided by deep broad furrows, the red-brown surface being broken into thin persistent plate-like scales. The branchlets are red-brown at first and coated with pale pubescence, but soon become glabrous and sometimes covered with a glaucous bloom, and in their second season are silver gray or dark brown, and for many years are marked by the conspicuous elevated leaf-scars which give a moniliform appearance to the branches of slow-grown stunted individuals. The leaves, which remain on the branches until the end of their second summer, are crowded, narrowly lanceolate, acute at both ends, apiculate, and entire, with thick revolute margins; they are thick and coriaceous, reticulate-veined, with broad thick midribs deeply grooved on the upper side, and obscure primary veins, usually puberulous when young but at maturity glabrous on the upper surface, and more or less coated with pale or rufous pubescence on the lower surface, and are resinous, half an inch to an inch in length, a third to two thirds of an inch in width, and are borne on short broad petioles. The stipules are minute, nearly triangular, and caducous. The flowers are solitary, sessile in the axils of the clustered leaves, two thirds of an inch long, the calyx with acute lobes covered with pale tomentum. The enlarged calyx-tube of the fruit is almost half an inch long, nearly cylindrical but rather larger above than below, ten-ribbed, obscurely ten-angled, slightly cleft at the apex, and coated with pale tomentum. The akene is chestnut-brown, pointed at the two ends, obscurely angled, a quarter of an inch long, and clothed with long pale or tawny hairs similar to those that cover the tail-like lengthened style which at maturity is two or three inches in length, and is generally contracted by one or two partial corkscrew twists.

Cercocarpus ledifolius inhabits the mountain ranges of the interior region of the United States, and is distributed from western Wyoming to the western slopes of the Rocky Mountains of Montana, the Cœur d'Alêne Mountains of Idaho, and the eastern portions of the Blue Mountains of Oregon, and southward through the Wasatch Mountains and the ranges of the Great Basin to the eastern slopes of the Sierra Nevada and the northern slopes of the San Bernardino Mountains and to the mountains of northern New Mexico and Arizona. It inhabits dry gravelly arid slopes at elevations of from five thousand to nine thousand feet above the level of the ocean, growing sometimes on almost precipitous cliffs and on rocky ridges, where it is a densely branched contorted shrub which often forms broad thickets, or, on better soil and with more moisture, rising to a shapely tree and reaching its greatest size on the high foothill-slopes of the mountain ranges of central Nevada between six thousand and eight thousand feet above the level of the sea.[1]

[1] Sargent, *Am. Jour. Sci.* ser. 3, xvii. 420.

The wood of *Cercocarpus ledifolius* is very heavy, hard, and close-grained, although brittle and extremely difficult to work. It contains numerous thin medullary rays, and is bright clear red or often rich dark brown, with thin yellow sapwood composed of fifteen or twenty layers of annual growth, and is susceptible of receiving a beautiful polish. The specific gravity of the absolutely dry wood is 1.0731, a cubic foot weighing 66.88 pounds. It furnishes the most valuable fuel produced in the region that it inhabits, and in the Great Basin is largely manufactured into charcoal used in smelting silver ore.

A variety of this plant, *Cercocarpus ledifolius*, var. *intricatus*,[1] a low intricately branched shrub, distinguished by its linear revolute leaves and small flowers and fruit, is common on the mountain ranges of Utah and Arizona, where, at high elevations, it sometimes covers cliffs and rocky mountain slopes, and at lower elevations gradually and by many intermediate forms passes into the large-leaved upright arborescent form.[2]

Cercocarpus ledifolius was discovered in 1834 by Thomas Nuttall[3] in the valley of the upper Snake River in western Wyoming.

Few other trees produce more valuable fuel than *Cercocarpus ledifolius;* this fact, and its ability to thrive under the most severe climatic conditions and to clothe and protect exposed mountain slopes where few other trees could maintain themselves and where no other hard-wood tree is found, make it one of the most valuable trees of the North American forests[4] in spite of its small size and its slow rate of growth.[5]

[1] M. E. Jones, *Zoë*, ii. 244.

Cercocarpus intricatus, Watson, *Proc. Am. Acad.* x. 346. — Sargent, *Forest Trees N. Am. 10th Census U. S.* ix. 71.

Cercocarpus brevifolius, Watson, *King's Rep.* v. 83 (not Gray).

Cercocarpus Arizonicus, M. E. Jones, *Zoë*, ii. 14.

[2] Parry, *Proc. Davenport Acad.* i. 147.

[3] See ii. 34.

[4] Seeds of *Cercocarpus ledifolius* were sent to the principal botanical establishments of Europe from the Arnold Arboretum in 1878. It is still, however, exceedingly rare in cultivation, although it may be expected to flourish on the dry high mountain slopes of southern Europe and northern Africa, and in some parts of India.

[5] A specimen in the Jesup Collection of North American Woods in the American Museum of Natural History in New York displays one hundred and eight layers of annual growth, and inside the bark is only thirteen inches in diameter.

EXPLANATION OF THE PLATE.

PLATE CLXV. CERCOCARPUS LEDIFOLIUS.

1. A flowering branch, natural size.
2. Diagram of a flower.
3. A flower, enlarged.
4. Vertical section of a flower, enlarged.
5. An ovule, much magnified.
6. A fruiting branch, natural size.
7. A fruit inclosed in the tube of the calyx, enlarged.
8. An akene divided transversely, enlarged.
9. Vertical section of a fruit, enlarged.
10. An embryo, much magnified.
11. A leaf with stipules, enlarged.

C.E. Faxon del. Picart fr. sc.

CERCOCARPUS LEDIFOLIUS, Nutt.

A. Riocreux direx.t Imp. R. Taneur, Paris.

CERCOCARPUS PARVIFOLIUS.

Mountain Mahogany.

LEAVES cuneate-obovate, coarsely glandular-serrate above the middle.

Cercocarpus parvifolius, Nuttall; Hooker & Arnott, *Bot. Voy. Beechey*, 337. — Torrey & Gray, *Fl. N. Am.* i. 427; *Pacific R. R. Rep.* ii. 164. — Hooker, *Icon.* iv. t. 323. — Walpers, *Rep.* ii. 45. — Torrey, *Frémont's Rep.* 89; *Emory's Rep.* 139; *Sitgreaves' Rep.* 158; *Pacific R. R. Rep.* iv. 83; *Bot. Mex. Bound. Surv.* 63; *Bot. Wilkes Explor. Exped.* 287. — Dietrich, *Syn.* iii. 119. — Gray, *Smithsonian Contrib.* iii. 68; v. 54 (*Pl. Wright.* i., ii.). — Watson, *King's Rep.* v. 82. — Rothrock, *Wheeler's Rep.* vi. 111, 359. — Brewer & Watson, *Bot. Cal.* i. 174; ii. 444. — M. E. Jones, *Excur. Bot.* 12, 15, 20, 21; *Zoë*, ii. 245. — Hemsley, *Bot. Biol. Am. Cent.* i. 374. — Watson, *Proc. Am. Acad.* xvii. 353. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 71. — Coulter, *Man. Rocky Mt. Bot.* 81. — Greene, *Fl. Francis.* i. 59.

Cercocarpus fothergilloides, Torrey, *Ann. Lyc. N. Y.* ii. 198 (not Humboldt, Bonpland & Kunth).

A bushy tree, with aromatic leaves and branches, sometimes twenty to thirty feet in height, with a trunk which rarely attains a greater diameter than ten inches, and slender rigid upright branches; or more often a small or tall shrub branching from a thickened base. The bark of the trunk is a sixteenth of an inch thick, the generally smooth surface being divided by narrow shallow fissures and broken into small square persistent red-brown scales. The branchlets are clothed at first with pale silky pubescence; this soon disappears, and during their first year they are rather bright red-brown and are marked by occasional oblong light-colored lenticels, and in their second year are dark gray or brown and covered with the conspicuous ring-like leaf-scars. The leaves, which do not fall until the summer of their second year, are cuneate-obovate, rounded or obtuse or rarely acuminate and gradually contracted at the base, coarsely glandular-serrate above the middle, or rarely almost entire, or slightly three-toothed or apiculate at the apex; when they unfold they are coated with pale pubescence on both surfaces, and at maturity are puberulous or glabrous above and more or less pubescent below, and are subcoriaceous, dark yellow-green on the upper, and paler or often nearly white or sometimes ferrugineous on the lower surface, half an inch to two and a half inches in length and a quarter of an inch to an inch in breadth, with slightly thickened and revolute margins, broad midribs, four to six pairs of conspicuous primary veins, and reticulate veinlets; and they are borne on broad channeled petioles which vary from an eighth to nearly half an inch in length. The stipules are lanceolate, acuminate, apiculate, from an eighth to a quarter of an inch in length, and early deciduous. The flowers, which are produced on slender hairy pedicels, are solitary or geminate in the axils of the crowded leaves, and are a quarter of an inch long, with a slender tube covered on the outer surface with pale tomentum and a narrow obtusely lobed limb. The mature calyx-tube of the fruit is spindle-shaped, light chestnut-brown, slightly puberulous, deeply cleft at the apex, and from one half to three quarters of an inch long. The akene is more or less conspicuously sulcate on the back and is covered, like the persistent tail-like style which is often four or five inches in length, with long white hairs.

Cercocarpus parvifolius is widely and generally distributed on the mountain ranges of the arid portions of western North America from western Nebraska[1] to the northern slopes of the Siskiyou Mountains in Oregon[2] on the north, and to western Texas[3] and northern Mexico on the south; in California, west of the Sierra Nevada Mountains, it is common through the coast ranges, extending south to the San Jacinto Mountains; it occurs on Santa Cruz Island[4] and on some of the mountain ranges of Lower California.

[1] Bessey, *Bull. Agric. Exper. Stat. Nebraska*, iv. art. iv. 19.

[2] Greene, *Garden and Forest*, ii. 470.

[3] Coulter, *Contrib. U. S. Nat. Herb.* ii. 104 (*Man. Pl. W. Texas*).

[4] Greene, *Bull. Cal. Acad.* ii. 396 (as *C. betulæfolius*).

The wood of *Cercocarpus parvifolius* is heavy, hard, and close-grained and difficult to season and work; it contains numerous thin medullary rays, and is bright red-brown, with thin light brown sapwood composed of twenty layers of annual growth. The specific gravity of the absolutely dry wood is 0.9365, a cubic foot weighing 58.36 pounds. It makes excellent fuel, and is sometimes used by turners for boxes and other small objects. The shoots and leaves, which possess a birch-like flavor, are relished by cattle, which browse upon them in late summer and autumn after the annual grasses have disappeared.[1]

Cercocarpus parvifolius varies in the size and shape of its leaves and in the amount of their pubescence in different parts of the territory it inhabits; in the California coast ranges it frequently produces larger fruit than is developed in the dry interior parts of the country, and larger and proportionately broader leaves which are often quite glabrous,[2] while near the southern boundary of the United States the leaves are sometimes much reduced in size[3] and are entire or sparingly toothed.[4]

Cercocarpus parvifolius was discovered in the Rocky Mountains on the head-waters of the Platte River in 1820 by Dr. Edwin P. James,[5] the naturalist of Long's expedition. In California it was first noticed a few years later by David Douglas.[6] *Cercocarpus parvifolius* is sometimes seen in the botanic gardens of Europe, where it occasionally flowers and produces its fruit.

[1] Greene, *Garden and Forest*, ii. 470.

[2] *Cercocarpus parvifolius*, var. *betuloides*.

Cercocarpus betuloides, Nuttall; Torrey & Gray, *Fl. N. Am.* i. 427. — Hooker, *Lond. Jour. Bot.* vi. 218.

Cercocarpus betulæfolius, Nuttall; Hooker, *Icon.* iv. t. 322. — Walpers, *Rep.* ii. 46. — Greene, *Bull. Cal. Acad.* ii. 396; *Garden and Forest, l. c.; Fl. Francis.* i. 59.

Cercocarpus parvifolius, var. *glaber*, Brewer & Watson, *Bot. Cal.* i. 175. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 71.

Professor E. L. Greene, whose opportunities for studying the trees of western America in their native forests have been great, believes (*Garden and Forest, l. c.*) that the California coast plant is specifically distinct from the plant of the dry interior part of the country on account of "a certain constant difference in the general bearing or habit easily seen at a glance but not easily defined," and of the character of the bark, which on the coast plant is smooth and gray, "the outer layer deciduous and falling away in irregular flakes in the early autumn," while on the Rocky Mountain plant it is "dark-colored, thick, persistent, and fissured;" but these differences, like the more arborescent habit, the better developed leaves, and the absence of pubescence, are perhaps due to the more favorable climatic conditions amid which the coast plants have grown.

[3] *Cercocarpus parvifolius*, var. *brevifolius*, M. E. Jones, *Zoë*, ii. 245.

Cercocarpus brevifolius, Gray, *Smithsonian Contrib.* v. 54 (*Pl. Wright.* ii.). — Walpers, *Ann.* iv. 665.

[4] *Cercocarpus parvifolius*, var. *paucidentatus*, Watson, *Proc. Am. Acad.* xvii. 353. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 71. This form, which is not uncommon in northern Mexico and in the mountains of southern Arizona, is connected by many intermediate forms with that of the Colorado mountains, which has large and coarsely serrate leaves, just as the last-named passes imperceptibly into the still larger-leaved plant of the California coast.

[5] See ii. 96.

[6] See ii. 94.

EXPLANATION OF THE PLATE.

PLATE CLXVI. CERCOCARPUS PARVIFOLIUS.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. Vertical section of a flower, enlarged.
4. Front and rear views of a stamen, enlarged.
5. A pistil, enlarged.
6. A fruiting branch, natural size.
7. A fruit, inclosed in the tube of the calyx, enlarged.
8. An akene, enlarged.
9. Vertical section of an akene, enlarged.
10. A seed, enlarged.
11. An embryo, much magnified.

C.E.Faxon del. Picart, fr. sc.

CERCOCARPUS PARVIFOLIUS, Nutt.

A.Riocreux direx.t Imp. R.Taneur, Paris.

PYRUS.

Flowers perfect or rarely polygamo-diœcious by abortion, regular; calyx 5-lobed, the lobes imbricated in æstivation; petals 5, imbricated in æstivation; stamens usually 20, or indefinite; ovary 2 to 5-celled; ovules 2 in each cell, ascending. Fruit a pome. Leaves alternate, simple or pinnate, deciduous.

Pyrus, Linnæus, *Gen.* 145 (excl. *Cydonia*). — Adanson, *Fam. Pl.* ii. 296 (excl. *Cydonia*). — A. L. de Jussieu, *Gen.* 335. — Meisner, *Gen.* 106. — Endlicher, *Gen.* 1237. — Bentham & Hooker, *Gen.* i. 626 (excl. *Cydonia* and *Mespilus*). — Baillon, *Hist. Pl.* i. 403.
Sorbus, Linnæus, *Gen.* 144. — Adanson, *Fam. Pl.* ii. 296. — A. L. de Jussieu, *Gen.* 335.
Malus, Ruppius, *Fl. Jen.* ed. 3, 141. — Medicus, *Phil. Bot.* i. 138.
Torminalis, Medicus, *Phil. Bot.* i. 134.
Lazarolus, Medicus, *Phil. Bot.* i. 135.
Aucuparia, Medicus, *Phil. Bot.* i. 138.
Chamæmespilus, Medicus, *Phil. Bot.* i. 138.
Pirophorum, Necker, *Elem. Bot.* ii. 72.
Apirophorum, Necker, *Elem. Bot.* ii. 72.
Hahnia, Medicus, *Gesch. Bot.* 81.
Azarolus, Borkhausen, *Handb. Forstbot.* ii. 1224.
Aronia, Persoon, *Syn.* ii. 39 (excl. *Amelanchier*).
Aria, Host, *Fl. Austr.* ii. 7.
Cormus, Spach, *Hist. Vég.* ii. 96.
Torminaria, Roemer, *Fam. Nat. Syn.* iii. 101.
Micromeles, Decaisne, *Nouv. Arch. Mus.* x. 168.
Chloromeles, Decaisne, *Fl. des Serres*, xxiii. 156.

Trees or shrubs, with smooth or scaly bark, terete branches, imbricated bud-scales, and fibrous roots. Leaves involute or conduplicate in vernation, simple, palmately lobed or unequally pinnate, usually serrate, deciduous; stipules entire or lobed, free from the petiole, deciduous. Flowers in simple or compound terminal cymes, rarely corymbose or racemose or one or two-flowered, from buds formed the previous year. Bracts and bractlets subulate or foliaceous, deciduous. Calyx-tube urceolate or rarely turbinate, adnate to the ovary and fleshy at maturity, the five-lobed limb with acuminate reflexed lobes persistent, or deciduous with the apex of the receptacle. Disk lining the tube of the calyx, more or less thickened over the ovary. Petals white, pink, or red, suborbicular, unguiculate, inserted on the slightly thickened border of the disk. Stamens usually twenty, inserted in three rows, those of the outer row of ten parapetalous, those of the other rows alternate with them and with each other; filaments subulate, free or slightly connate at the base; anthers oblong, pale, red, or purple, attached on the back, two-celled, the cells opening longitudinally. Carpels five, alternate with the petals, or two to four, inserted in the bottom of the calyx-tube and united into an inferior ovary; styles terminal, free, or united below; stigmas capitate, truncate; ovules two in each cell, ascending, collateral, anatropous, the raphe dorsal, the micropyle inferior. Fruit an ovoid globose or pyriform pome formed by the thickening of the walls of the calyx-tube and its consolidation with the ovary; mesocarp more or less fleshy, the flesh homogeneous or granular, adherent to the one to five-celled endocarp, the cells crustaceous or cartilaginous, usually two-valved. Seeds two or by abortion one in each cell, ovate, acute, erect, exalbuminous; testa usually cartilaginous, chestnut-brown and lustrous, slightly mucilaginous on the outer surface. Embryo erect; cotyledons plano-convex, fleshy; radicle short, inferior.[1]

[1] The genus Pyrus may be divided into the following sections which some authors consider entitled to the rank of genera: —

Malus. Flowers fascicled or subumbellate on short spur-like lateral branchlets; ovary 3 to 5-celled; styles more or less united below. Fruit globose, umbilicate or rounded at the base; the flesh homogeneous. Leaves entire, or laciniate on vigorous shoots.

Pyrus. Flowers in few-flowered corymbs on short spur-like lateral branchlets; ovary 5-celled; styles free. Fruit pyriform or subglobose, tapering at the base, the flesh granular. Leaves simple.

Aria. Flowers in corymbose cymes; ovary 2 to 5-celled; styles free. Fruit pyriform or globose; flesh granular. Leaves entire or lobed.

Aronia. Flowers in compound corymbs; ovary 4 or 5-celled; styles united at the base. Fruit berry-like, pyriform or subglobose. Leaves simple, their midribs glandular on the upper side.

The genus Pyrus is widely and generally distributed through the temperate parts of the northern hemisphere; from thirty to forty species may be distinguished, the largest number inhabiting south-central and eastern Asia. In North America the genus is represented by seven species, of which five are small trees and two are shrubs of the eastern states;[1] in Europe, where the genus is distributed from Great Britain and Scandinavia to Spain, southern Italy, and Greece, eight or nine species with many natural varieties are recognized.[2] Pyrus is spread through the mountain regions of the Orient,[3] and abounds in the Himalayas with twenty-two species,[4] and in China and Japan,[5] where botanists recognize fourteen or fifteen species.[6]

Pyrus is chiefly valuable to man for the fruits of *Pyrus Malus*,[7] the Apple, and of *Pyrus communis*,[8] the Pear, which supply him with important articles of food, and with alcoholic liquors.[9]

MICROMELES. Flowers in cymose corymbs; calyx-lobes deciduous; ovary 2 to 3-celled; styles free or united. Fruit small, globose, umbilicate. Leaves simple.

SORBUS. Flowers in ample compound cymes; ovary 2 to 4, usually 3-celled; styles 3. Fruit subglobose, berry-like, crowned with the thickened and often incurved persistent calyx-lobes. Leaves unequally pinnate, the leaflets conduplicate in vernation.

[1] These both belong to the section Aronia and are distributed through all the country east of the mid-continental plateau from Nova Scotia to Florida and Louisiana. They are: —

Pyrus arbutifolia, Linnæus f. *Syst.* ed. 13, Suppl. 256. — *Bot. Mag.* t. 3668. — Torrey & Gray, *Fl. N. Am.* i. 471. — Chapman, *Fl.* 128. — Watson & Coulter, *Gray's Man.* ed. 6, 164. — Sargent, *Garden and Forest*, iii. 416, f. 52.

Mespilus arbutifolia, Linnæus, *Spec.* 478.

Pyrus nigra, Sargent, *Garden and Forest*, iii. 416.

Pyrus arbutifolia, var. *nigra*, Willdenow, *Spec.* ii. pt. ii. 1013.

Mespilus arbutifolia, var. *melanocarpa*, Michaux, *Fl. Bor.-Am.* i. 292.

Pyrus arbutifolia, var. *melanocarpa*, Hooker, *Fl. Bor.-Am.* i. 204. — Torrey & Gray, *l. c.* — Chapman, *l. c.* 129. — Watson & Coulter, *l. c.*

[2] Nyman, *Conspect. Fl. Europ.* 240.

[3] Boissier, *Fl. Orient.* ii. 653.

[4] Hooker f. *Fl. Brit. Ind.* ii. 372.

[5] Franchet & Savatier, *Enum. Pl. Jap.* i. 138. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xix. 169 (*Mél. Biol.* ix. 164). — Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 254.

[6] Of the different sections of the genus, Malus is eastern and western North American, European, and Asiatic, one species being now, through cultivation, widely naturalized beyond its original home. Pyrus is southern European, western Asiatic, and eastern Asiatic.

Aria is northern European, western Asiatic, Himalayan, and eastern Asiatic. Aronia is eastern North American. Micromeles is Himalayan. Sorbus, the most widely distributed of the sections into which the genus is divided, is spread over the boreal and elevated portions of the three continents.

[7] Linnæus, *Spec.* 479. — De Candolle, *Prodr.* ii. 635. — Maximowicz, *l. c.* 165. — Brandis, *Forest Fl. Brit. Ind.* 205. — Hooker f. *l. c.*

Malus communis, Desfontaines, *Hist. Arb.* ii. 140. — Boissier, *l. c.* 656. — Decaisne, *Nouv. Arch. Mus.* x. 135.

The native country of *Pyrus Malus* is uncertain; it is believed to be indigenous in the northwestern Himalayas, where it ascends to an elevation of nine thousand feet above the level of the ocean and of eleven thousand four hundred feet in western Thibet (Hooker f. *l. c.*), and in Anatolia, where, on the mountains of Trebizond along the southern shores of the Black Sea, it forms forests of considerable extent (Boissier, *l. c.*). In southern and central Europe it has existed either in a wild or cultivated state since prehistoric times (A. de Candolle, *Origine des Plantes Cultivées*, 186); and in some parts of the eastern United States it already grows spontaneously (Britton, *Cat. Pl. N. J.* 99).

Pyrus Malus has been cultivated in Europe since the days of the ancients, and from time immemorial in India, Cashmere, and northern China. It is the most valuable fruit-tree of the temperate zones, and thousands of varieties have been obtained from it by selection and cultivation, or by crossing its cultivated varieties with *Pyrus prunifolia* (Willdenow, *Spec.* ii. pt. ii. 1018 — De Candolle, *Prodr.* ii. 635) or perhaps with varieties of *Pyrus baccata*. It is from these crosses that the best varieties of the cultivated Crab-apples have been obtained.

[8] Linnæus, *l. c.* 479. — De Candolle, *l. c.* 633. — Boissier, *l. c.* 653. — Brandis, *l. c.* 203. — Hooker f. *l. c.* 374.

Pyrus communis grows naturally in nearly all the elevated regions of Europe and in western Asia, especially in Anatolia, the southern Caucasian provinces, and northern Persia; it grows spontaneously in northern and northeastern Europe and perhaps naturally in Cashmere and the northwestern Himalayas (A. de Candolle, *l. c.* 183).

The Pear-tree, which has been cultivated in Europe from ancient times, has given rise to innumerable varieties, many of which were known to the Romans in the time of Pliny, and the lists of pomologists now contain the names of hundreds of cultivated Pears (Decaisne, *Le Jardin Fruitier*, i. *Poirier*, 72. — Downing, *The Fruits and Fruit-Trees of America*, ed. 2, 639) which have been derived from *Pyrus communis*, and from *Pyrus nivalis* (Jacquin, *Fl. Austr.* ii. 4, t. 107. — Decaisne, *l. c.* 326, t. 21), from which is derived the race of Pears with hard acid fruit cultivated for cider (A. de Candolle, *l. c.* 185), or from the intercrossing of the different species of the section Pyrus, which are sometimes believed to represent geographical races of one widely distributed polymorphous species (Decaisne, *l. c.* 132).

[9] Cider, which contains from four to ten per cent. of alcohol, is made from the juice of the ripe fruit of the Apple, which is pressed from the pulp and allowed to ferment in open casks; at the end of two or three days the liquor is drawn off, put into fresh casks, and allowed to settle in a low regular temperature for thirty or forty days when the process is complete. Cider is of three qualities, rough, sweet, and bitter. The first is made by grinding unripe or carelessly selected fruit, the juice being allowed full fermentation, and the second is made from fully ripe sweet apples, the process of fermentation being checked before completion. Bitter cider owes its peculiarities of flavor to the character of the fruit from which it is made. Ciderkin is made by infusing with boiling water

Pyrus Sinensis,[1] a native of northern China, has long been cultivated on an extensive scale in China[2] and Japan[3] for its large and handsome fruit, and recently has attracted the attention of pomologists in the United States and Europe.[4] The fruit of most of the species, especially of those of the section Sorbus, contains malic and tartaric acids,[5] and the unripe fruit and bark of these plants are astringent and are sometimes employed medicinally.[6]

The wood of Pyrus is hard, heavy, and close-grained, and that of several of the species is esteemed by millwrights, turners, and engravers, and makes excellent fuel. The beauty and abundance of their flowers and fruit, their excellent habit, and their hardiness, make many of the species valuable garden plants, particularly the Asiatic *Pyrus baccata*[7] with its numerous varieties, *Pyrus Toringo*,[8] *Pyrus spectabilis*,[9] *Pyrus salicifolia*,[10] the various North American species, and the species of Sorbus[11] and Aria.[12]

the marc or refuse left after the juice has been extracted from the fruit for cider, the mass being again subjected to pressure. Cider is manufactured principally in the eastern United States, in several English counties, principally Herefordshire, Devonshire, and Somerset, in Normandy and Brittany in France, and in northern Germany. Vinegar is sometimes made from cider which has soured owing to a deficiency of alcohol, by exposure to spontaneous acetification.

Perry, which resembles cider, is made by the same process from varieties of the pear selected on account of their austere juice. It is principally produced in southern England and in western France, where Pear-trees are cultivated on a large scale for this purpose (Loudon, *Arb. Brit.* ii. 884. — Spons, *Encyclopædia of the Industrial Arts, Manufactures, and Raw Commercial Products*, i. 414, 421).

[1] Lindley, *Trans. Hort. Soc. Lond.* vi. 396 ; *Bot. Reg.* t. 1248. — Decaisne, *Le Jardin Fruitier*, i. *Poirier*, 331, t. 5. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xix. 172 (*Mél. Biol.* ix. 168). — Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 257.

Pyrus communis, Thunberg, *Fl. Jap.* 207 (not Linnæus).

Pyrus Ussuriensis, Maximowicz, *Prim. Fl. Amur.* 102.

[2] Loureiro, *Fl. Cochin.* 321. — Bretschneider, *Early European Researches into the Flora of China*, 150.

[3] With the exception of the Persimmon the Pear is the most common fruit-tree of Japan, where it was early introduced from northern China. Several varieties have been developed in Japanese gardens, but they differ less from each other than the pears of European origin, although some ripen in the summer and others in the autumn. In the neighborhood of large cities there are Pear-orchards in which the trees are carefully cultivated and manured ; the tops are trained over Bamboo frames, and too vigorous shoots are removed to insure the production of large crops of fruit. The trees are propagated by grafting selected varieties on seedling stocks, and often by cuttings which are made in March from stout yearling shoots ; these are pointed, their ends are charred, and they are then set in rows in deep rich soil, and at the end of a few years are transplanted into the orchards (Rein, *Japan nach Reisen und Studien im Auftrage der Königlich Preussischen Regierung*, ii. 99).

[4] Downing, *The Fruits and Fruit-Trees of America*, ed. 2, 851. — *Gard. Chron.* n. ser. iv. 456, f. 95 ; ser. 3, ix. 141, f. 36. — *Rev. Hort.* 1878, 310, t. ; 1885, 286, f. 49.

[5] Baillon, *Traité Bot. Med.* 559.

[6] Linnæus, *Mat. Med.* 81. — Stillé & Maisch, *Nat. Dispens.* 1334.

[7] Linnæus, *Mant.* 75. — De Candolle, *Prodr.* ii. 635. — Maximowicz, *l. c.* 166. — Hooker f. *Fl. Brit. Ind.* ii. 373. — Forbes & Hemsley, *l. c.* 255.

Pyrus baccata, which is widely distributed in Siberia, in the Himalayas, and in northern China and Japan, has been cultivated as a garden ornament by the Chinese and Japanese from very early times, and many forms have been developed in their gardens differing in the habit of the plants, in the size and character of the fruit, and in the color of the flowers, which are sometimes semi-double ; among these varieties are some of the most beautiful of all flowering trees, and their free-flowering habit, hardiness, and immunity from disease and the attacks of insects commend them to the attention of gardeners (*Fl. des Serres*, xv. 161, t. 1585, 1586, 1587. — Carrière, *Pommiers Microcarpes*, 68. — *Garden and Forest*, ii. 260, 520, f. 139).

[8] Siebold, *Cat. Rais.* i. 4. — Koch, *Dendr.* i. 212. — Maximowicz, *l. c.* 167.

Pyrus Sieboldii, Regel, *Gartenflora*, viii. 82.

Malus Toringo, Carrière, *Rev. Hort.* 1872, 210, f. 25 ; *Pommiers Microcarpes*, 61, f. 11.

[9] Aiton, *Hort. Kew.* ii. 175. — *Nouveau Duhamel*, vi. 141, t. 42, f. 2. — Watson, *Dendr. Brit.* i. 50, t. 50. — Koch, *l. c.* 209. — Maximowicz, *l. c.* 166. — Forbes & Hemsley, *l. c.* 258.

This tree, which is believed to be a native of northern China and is known in cultivation only in a form with semidouble flowers, is one of the handsomest of the small-fruited Apple-trees, appearing in gardens as a tree-like shrub with erect slightly spreading branches, which are covered every spring with masses of fragrant pink or rose-colored flowers (*Garden and Forest*, i. 272, f. 214 ; ii. 260).

[10] Linnæus f. *Syst.* ed. 13, Suppl. 255. — Pallas, *Fl. Ross.* i. 20, t. 9 ; *Voyages*, v. 504, t. 11, f. 1. — *Nouveau Duhamel*, vi. 189, t. 56. — *Bot. Reg.* t. 514. — Decaisne, *l. c.* 310, t. 12. — Koch, *l. c.* 218.

[11] The Old World Sorbus (*Pyrus aucuparia*, Gærtner, *Fruct.* ii. 45, t. 87 [*Sorbus aucuparia*, Linnæus, *Spec.* 477. — Maximowicz, *l. c.* 170]), the Scottish Rowan-tree or Mountain Ash, is widely distributed through the forests of mountainous regions from the shores of the Atlantic Ocean to Japan, extending north to the arctic circle, where it is reduced to a stunted shrub. For centuries it has been a favorite tree with planters, and varieties with yellow and with orange-colored fruit and with pendulous branches have appeared. (See Gilpin, *Forest Scenery*, ed. 2, 138. — Loudon, *l. c.* 916.)

The fruit of the Rowan-tree is greedily devoured by birds, and it is often planted to supply them with food. The fruit is sometimes made into flour, or is eaten uncooked in northern Europe and in Siberia ; infused with water it produces a pleasant subacid beverage, and by distillation a powerful spirit. The wood, which is hard and close-grained, is often used for the handles of tools and the cogs of wheels, and by wheelwrights and turners (Evelyn, *Silva*, ed. Hunter, i. 211. — Mathieu, *Flore Forestière*, ed. 2, 131).

[12] *Pyrus Aria* (Ehrhart, *Beitr.* iv. 20), the White Beam-tree, is distributed from western Europe to Japan, and is common in the

Many insects[1] feed upon the different species of Pyrus, which are also subject to serious fungal diseases.[2]

Pirus, the classical name of the Pear-tree, was changed to Pyrus by Tournefort,[3] and then adopted by Linnæus, who, in establishing his genus, united with Pyrus the Cydonia[4] and Malus[5] of Tournefort.

forests of northern Europe and Asia, in the mountainous regions of central and southern Europe, and of central, southern, and western Asia. It is valued by planters for the beauty of its entire or variously divided ample leaves, which are pale or sometimes nearly white on the lower surface, and for its subacid and astringent fruit, which is a favorite food of birds, and is sometimes made into flour and often fermented into a kind of beer or distilled into a powerful spirit.

The wood of the White Beam-tree is hard, strong, and durable, and is largely employed for the handles of tools and the bearings of machinery, and by wheelwrights and turners (Loudon, *Arb. Brit.* ii. 910. — Mathieu, *Flore Forestière*, ed. 2, 123).

[1] Many of the insects which injure the different species of Prunus in America also attack the native Apples, and Mountain Ashes are sometimes seriously injured by them. Tent-caterpillars and the larvæ of Tussock-moths are often abundant on the Apple, and the Mountain Ash suffers from attacks of the Fall Web-worm (*Hyphantria cunea*, Drury). *Datana ministra*, Drury, often completely defoliates the branches of small trees, and *Œdemasia concinna*, Smith & Abbot, commits similar depredations. Great destruction among the trees of this genus, and often their death, is caused by borers. The Apple-tree Borer (*Saperda bivittata*, Say) and the Flat-headed Borer (*Chrysobothris femorata*, Fabricius) are the most destructive to the Apple and the Mountain Ash. Several Scale-insects affect the bark and branches, the most harmful being the Scurfy Bark-louse (*Chionaspis furfurus*, Fitch) and *Mytilaspis pomicorticis*, Riley. The foliage is also injured by Aphids, and the fruit of the Wild Apple by the ravages of the Codlin-moth and a Curculio (*Anthonomus quadrigibbus*, Say). No less than eighty-one species of insects which attack the cultivated Apple in America are enumerated by Saunders (*Insects injurious to Fruits*, 13), and most of them may be discovered on the wild species also.

[2] Of the Fungi which attack the North American species of Pyrus, the most interesting are the different *Rœsteliæ*, found on the leaves and less frequently on the fruit and young stems of most of the species. The *Rœsteliæ*, commonly called Cluster-cups, belong to the order *Uredineæ* or Rusts, a group of plants which pass through several different stages in their development, in some of the stages appearing as parasites on certain genera of flowering plants, while in others they may be parasitic on entirely different genera. In the most highly differentiated Rusts there may be as many as four different stages during their development. The most destructive of these plants to our Wild Apples is *Rœstelia pyrata*, Thaxter, a Cluster-cup which usually grows in dense rings on the under side of the leaves of *Pyrus coronaria*, and sometimes on those of *Pyrus angustifolia* and several of the native species of Cratægus, and in a less striking form on the leaves of the cultivated Apple-tree. This species is peculiar to North America, and its teleutosporic stage is reached in the large yellow gelatinous masses common on the young branches of the Red Cedar in May. In the northern part of the country the leaves of the Mountain Ash, *Pyrus Americana*, exhibit large yellow spots, and on their under surface bear groups of long narrow Cluster-cups which appear identical with those of the European *Rœstelia cornuta*, Fries, although as yet the teleutosporic stage of this plant has not been detected in North America. Other fungi which attack the American species of Pyrus are *Entomosporium maculatum*, Levéillé, with curious ciliated spores, found commonly on the leaves of Quinces, Pears, and Apple-trees, as well as on Amelanchier and several species of Cratægus; and *Nummularia discreta*, Tulasne, most common on the branches of the Apple-tree, but sometimes seen on those of *Pyrus Americana*.

[3] *Inst.* 628, t. 404.

[4] *Inst.* 632, t. 405.

[5] *Inst.* 634, t. 406.

CONSPECTUS OF THE NORTH AMERICAN ARBORESCENT SPECIES.

MALUS. Flowers in simple umbellate or racemose cymes on spur-like lateral branches; styles 3 to 5, more or less united below. Trees with small winter-buds, scaly bark, and simple leaves, involute in vernation.

- Calyx-lobes persistent; fruit depressed at the base.
  - Leaves ovate, truncate or subcordate at the base, incisely serrate, often lobed, membranaceous . . . . . 1. P. CORONARIA.
  - Leaves lanceolate-oblong, acute at the base, crenulate-serrate, or nearly entire, subcoriaceous . . . . . 2. P. ANGUSTIFOLIA.
- Calyx-lobes deciduous; fruit not depressed at the base.
  - Leaves ovate-lanceolate, serrulate, often 3-lobed . . . . . 3. P. RIVULARIS.

SORBUS. Flowers in compound leafy cymes; styles usually 3, free. Trees with large winter-buds, smooth aromatic bark, and odd-pinnate leaves, the leaflets conduplicate in vernation.

- Leaflets lanceolate, acuminate . . . . . 4. P. AMERICANA.
- Leaflets oblong-oval to lance-ovate, mostly obtuse . . . . . 5. P. SAMBUCIFOLIA.

PYRUS CORONARIA.

Crab Apple. Fragrant Crab.

LEAVES ovate, truncate or subcordate at the base, incisely serrate, often lobed, glabrous to tomentose on the lower surface.

Pyrus coronaria, Linnæus, *Spec.* 480. — Du Roi, *Harbk. Baumz.* ii. 229. — Marshall, *Arbust. Am.* 118. — Castiglioni, *Viag. negli Stati Uniti*, ii. 344. — Willdenow, *Berl. Baumz.* 265; *Spec.* ii. pt. ii. 1019; *Enum.* 527. — Persoon, *Syn.* ii. 40. — Pursh, *Fl. Am. Sept.* i. 340. — Nuttall, *Gen.* i. 307. — Hayne, *Dendr. Fl.* 86. — Torrey, *Fl. N. Y.* i. 223. — *Bot. Mag.* t. 2009. — Elliott, *Sk.* i. 559. — *Bot. Reg.* t. 651. — Sprengel, *Syst.* ii. 510. — De Candolle, *Prodr.* ii. 635. — Don, *Gen. Syst.* ii. 647. — Reichenbach, *Fl. Exot.* iv. t. 240. — Torrey & Gray, *Fl. N. Am.* i. 470. — Dietrich, *Syn.* iii. 154. — Chapman, *Fl.* 128. — Curtis, *Rep. Geolog. Surv. N. Car.* 1860, iii. 69. — Brunet, *Cat. Vég. Lig. Can.* 26. — Koch, *Dendr.* i. 214. — Wenzig, *Linnæa*, xxxviii. 40 (excl. var.). — *The Garden*, xix. 400, t. 280. — Ridgway, *Proc. U. S. Nat. Mus.* 1882, 66. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 72. — Watson & Coulter, *Gray's Man.* ed. 6, 164. — L. H. Bailey, *Am. Garden*, xii. 472. — Gray, *Forest Trees N. Am.* t. 52.

Malus coronaria, Miller, *Dict.* ed. 8, No. 2. — Moench, *Meth.* 682. — Michaux, *Fl. Bor.-Am.* i. 292. — Poiret, *Lam. Dict.* v. 562. — Desfontaines, *Hist. Arb.* ii. 140. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 427. — *Nouveau Duhamel*, vi. 139, t. 44, f. 1. — Michaux f. *Hist. Arb. Am.* iii. 65, t. 10. — Spach, *Hist. Vég.* ii. 136, t. 8. — Roemer, *Fam. Nat. Syn.* iii. 191. — Decaisne, *Nouv. Arch. Mus.* x. 154. — Carrière, *Rev. Hort.* 1877, 410, t.

Cratægus coronaria, Salisbury, *Prodr.* 357.

Malus microcarpa coronaria, Carrière, *Pommiers Microcarpes*, 133, f. 17; *Rev. Hort.* 1884, 104, f. 24.

A tree, twenty-five to thirty feet in height, with a trunk twelve or fourteen inches in diameter, dividing, eight or ten feet above the ground, into several stout spreading branches which form a wide open head; or usually much smaller and sometimes barely more than a bushy shrub with rigid contorted branches. The bark of the trunk is one third of an inch thick, and longitudinally fissured, the outer layer separating into long narrow persistent red-brown scales. The branchlets are at first coated with thick white tomentum which soon disappears, and in their first winter are glabrous or slightly pubescent and covered with bright red-brown bark marked by occasional small pale lenticels; in their second year they develop long stout spur-like and somewhat spinescent lateral branches, and are then light brown. The winter-buds are minute, obtuse, and protected by bright red scales with dark scarious ciliate margins; those of the inner ranks enlarge with the growing shoots and at maturity are from one third to one half of an inch in length, oblong, acute, bright red, and glandular-serrate. The leaves are ovate or sometimes almost triangular, usually acute at the apex, often truncate or subcordate, and occasionally acute at the base, incisely serrate with glandular teeth, and often three-lobed, especially on vigorous shoots; when they unfold they are red-bronze, coated on the lower surface with pale tomentum, and pilose on the upper surface; at maturity they are membranaceous, bright green above, and paler, glabrous, or sometimes slightly pilose below, three or four inches long, and an inch and a half to two inches and a half broad, with broad midribs and primary veins grooved on the upper side, and conspicuous veinlets, and are borne on slender petioles an inch and a half to two inches in length, tomentose or pubescent at first but ultimately glabrous and often furnished near the middle with two dark glands. The stipules are filiform, acuminate, half an inch long, and early deciduous. The flowers, which appear when the leaves are almost fully grown, are produced in five or six-flowered umbels on slender pedicels an inch and a half to two inches in length, and are an inch and a half to nearly two inches across when expanded, and very fragrant. The calyx-tube is obconic, and pubescent or coated with thick white tomentum; this also covers the inner surface of the long acute lobes which end in rigid subulate points. The petals, which are inserted remotely one from another, are white or rose-colored, obovate, rounded

above, contracted below into long narrow claws, often crenulately serrate or undulate and sometimes irregularly and unequally dentate near the base of the blade. The stamens are shorter than the petals and for one third of their length, by a partial twist of the filaments at the base, form a tube narrowed in the middle and enlarged above. The ovary and the lower part of the styles are coated with long pale hairs. The fruit, which ripens late in the autumn, is suspended on slender stems and is depressed-globose, and an inch to an inch and a half in diameter. It is green when first fully grown and when ripe is yellow-green, somewhat translucent, deliciously fragrant, and covered with a waxy exudation.

Pyrus coronaria is distributed in Canada from the valley of the Humber River westward along the shores of Lake Erie;[1] it ranges southward through western New York and Pennsylvania to the District of Columbia, and along the Alleghany Mountains to central Alabama, and westward to southern Minnesota, eastern Nebraska,[2] eastern Kansas, the Indian Territory, northern Louisiana, and eastern Texas.[3] It usually grows in rich rather moist soil in forest glades where it sometimes forms considerable thickets, or less commonly on dry limestone hills, and reaches its greatest size in the valleys of the lower Ohio basin and in the states west of the Mississippi River.

The wood of *Pyrus coronaria* is heavy and close-grained, but not hard or strong; it contains numerous obscure medullary rays, and is brown to light red, with thick yellow sapwood composed of eighteen or twenty layers of annual growth. The specific gravity of the absolutely dry wood is 0.7048, a cubic foot weighing 43.92 pounds. It is employed for levers, the handles of tools, and many small articles of domestic use.

The fruit is used for preserves and is often manufactured into cider.

Pyrus coronaria varies somewhat in the form of its leaves, in the amount and persistence of the tomentum which covers their under surface, the young shoots and the calyces, and in the size of the fruit; and, especially west of the Alleghany Mountains, the eastern plant passes into the variety *Ioensis*,[4] which is distinguished by its elliptic-oblong to ovate-oblong leaves irregularly obtusely toothed, and while young densely coated on the lower surface, like the young shoots, with thick white tomentum, and by its larger fruit which is sometimes two inches in diameter. This is the common form of the Crab-apple of the Mississippi valley.

Pyrus coronaria did not attract the attention of early travelers in America; it appears, however, to have been introduced into English gardens as early as 1724,[5] and was described by Philip Miller in the first edition of the *Gardener's Dictionary* published in 1731.[6]

As an ornamental plant the American Crab-apple has many attractions; its small size and excellent habit render it useful in shrubberies and small gardens; its flowers, which do not appear until after those of other Apple-trees have fallen, are large and sweet, and the fragrant fruit, hanging gracefully on its long stems and remaining on the branches until after the leaves have dropped, make it interesting late in the autumn. Its horticultural value was early appreciated by the settlers of the middle and

[1] Brunet, *Cat. Vég. Lig. Can.* 26. — Macoun, *Cat. Can. Pl.* i. 145.

[2] Bessey, *Bull. Agric. Exper. Stat. Nebraska*, iv. art. iv. 20.

[3] Coulter, *Contrib. U. S. Nat. Herb.* ii. 106 (*Man. Pl. W. Texas*).

[4] Wood, *Cl. Book*, rev. ed. 333.

Pyrus Ioensis, L. H. Bailey, *Am. Garden*, xii. 473, f. 7, 8.

The Soulard Crab, which was first introduced many years ago into Illinois, has been variously considered a large-fruited variety of *Pyrus coronaria*, a natural hybrid between this species and the cultivated Apple-tree, and a native species (*Pyrus Soulardi*, L. H. Bailey, *l. c.*). Probably the first view is correct, as various forms appear to connect it with eastern and western varieties of *Pyrus coronaria*. The leaves are round-ovate to elliptic-ovate, usually rounded at the apex, and acute or rounded at the base, irregularly crenate-dentate, three or four inches long and two and a half inches broad, with short thick petioles; they are thick, rugose, and, while young, are coated on the lower surface with thick pale tomentum. The fruit is two to two and a half inches in diameter or often much smaller, but in color, in the waxy exudation from the skin, and in the character of the flesh is not distinguishable from that of the eastern tree (Downing, *The Fruits and Fruit-Trees of America*, ed. 2, 426). This form, which is not common in a wild state, appears to be distributed from Minnesota to Texas (L. H. Bailey, *l. c.*).

[5] Aiton, *Hort. Kew.* ii. 176. — Loudon, *Arb. Brit.* ii. 908.

[6] *Malus; sylvestris, Virginiana, floribus odoratis*, No. 3.

Malus sylvestris, floribus odoratis, Clayton, *Fl. Virgin.* 55.

eastern states,[1] and for more than a century it has been a favorite garden plant in America and Europe.[2]

[1] "Crab-Trees are a species of wild apple-trees, which grow in the woods and glades, but especially on little hillocks, near rivers. In *New Jersey* the tree is rather scarce; but in *Pennsylvania* it is plentiful. Some people had planted a single tree of this kind near their farms, on account of the fine smells which its flowers afford. It had begun to open some of its flowers about a day or two ago; however, most of them were not yet open. They are exactly like the blossoms of the common apple-trees, except that the colour is a little more reddish in the *Crab-trees;* though some kinds of the cultivated trees have flowers which are very near as red: but the smell distinguishes them plainly; for the wild trees have a very pleasant smell, somewhat like the rasp-berry. The apples, or crabs, are small, sour, and unfit for anything but to make vinegar of. They lie under the trees all the winter, and acquire a yellow colour. They seldom begin to rot before spring comes on. The Crab-trees opened their flowers only yesterday and to-day; whereas, the cultivated apple-trees, which are brought from *Europe*, had already lost their flowers." (Kalm, *Travels*, English ed. ii. 166.)

[2] *Rev. Hort.* 1877, 410, t.

EXPLANATION OF THE PLATES.

Plate CLXVII. Pyrus coronaria.

1. A flowering branch, natural size.
2. Diagram of a flower.
3. Vertical section of a flower, parts of the petals removed, enlarged.
4. An ovule, much magnified.
5. A fruiting branch, natural size.
6. Cross section of a fruit, natural size.
7. Vertical section of a fruit, natural size.
8. A seed, natural size.
9. Vertical section of a seed, enlarged.
10. An embryo, much magnified.
11. The base of a leaf showing stipules, natural size.
12. Winter-buds, natural size.

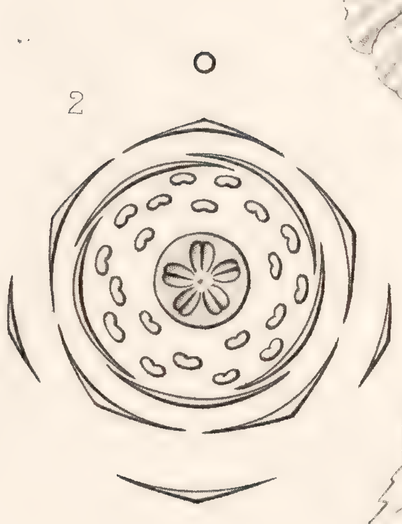
Plate CLXVIII. Pyrus coronaria, *var.* Ioensis.

1. A flowering branch, natural size.
2. Vertical section of a flower, the petals removed, enlarged.
3. A fruiting branch, natural size.
4. Vertical section of a fruit, natural size.
5. A seed, enlarged.
6. An embryo, magnified.
7. A vigorous leafy shoot, natural size.

3

4

1



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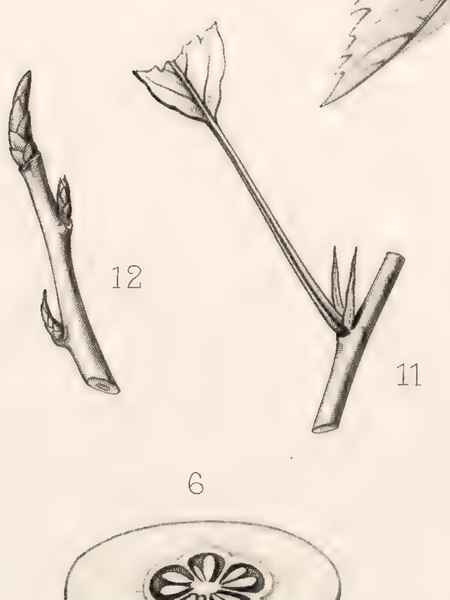

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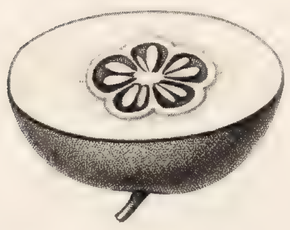

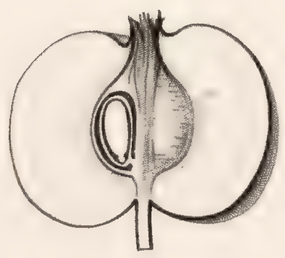

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C.E.Faxon del.

Picart fr.sc.

PYRUS CORONARIA, L.

A.Riocreux direx.t

Imp.R.Taneur, Paris.

C.E. Faxon del. *Rapine sc.*

PYRUS CORONARIA, var. IOENSIS, Wood.

A. Riocreux direx.t *Imp. R. Taneur, Paris.*

PYRUS ANGUSTIFOLIA.

Crab Apple.

LEAVES lanceolate-oblong, acute at the base, crenulate-serrate or nearly entire, subcoriaceous.

Pyrus angustifolia, Aiton, *Hort. Kew.* ii. 176. — Willdenow, *Spec.* ii. pt. ii. 1020. — Poiret, *Lam. Dict.* v. 455. — Persoon, *Syn.* ii. 40. — Pursh, *Fl. Am. Sept.* i. 340. — Elliott, *Sk.* i. 559. — Sprengel, *Syst.* ii. 509. — De Candolle, *Prodr.* ii. 635. — Watson, *Dendr. Brit.* ii. 132, t. 132. — *Bot. Reg.* t. 1207. — Don, *Gen. Syst.* ii. 647. — Torrey & Gray, *Fl. N. Am.* i. 471. — Dietrich, *Syn.* iii. 154. — Nuttall, *Sylva*, ii. 24. —Chapman, *Fl.* 128. — Curtis, *Rep. Geolog. Surv. N. Car.* 1860, iii. 69. — Koch, *Dendr.* i. 213. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 72. — Watson & Coulter, *Gray's Man.* ed. 6, 164. — L. H. Bailey, *Am. Garden*, xii. 472.

P. coronaria, Wangenheim, *Nordam. Holz.* 61, t. 21, f. 47 (not Linnæus). — Walter, *Fl. Car.* 148.

Malus angustifolia, Michaux, *Fl. Bor.-Am.* i. 292. — Decaisne, *Nouv. Arch. Mus.* x. 156.

Malus sempervirens, Desfontaines, *Hist. Arb.* ii. 141. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 428. — *Nouveau Duhamel*, vi. 138, t. 43, f. 1. — Poiret, *Lam. Dict.* Suppl. iv. 524. — Spach, *Hist. Vég.* ii. 135, t. 8. — Loiseleur, *Herb. Amat.* iii. t. 154. — Roemer, *Fam. Nat. Syn.* iii. 191.

P. coronaria, var. angustifolia, Wenzig, *Linnæa*, xxxviii. 41.

Chloromeles sempervirens, Decaisne, *Fl. des Serres*, xxiii. 156.

Malus microcarpa, sempervirens, Carrière, *Pommiers Microcarpes*, 136, f. 1. 18.

A tree, rarely attaining the height of thirty feet, with a short trunk eight or ten inches in diameter, and spreading rigid branches which form a wide open head. The bark of the trunk is from an eighth to a quarter of an inch in thickness, dark reddish brown, and divided by deep longitudinal fissures into narrow ridges, the surface of which is broken into small persistent plate-like scales. The young branches are clothed at first with pale pubescence which soon disappears; in their first winter they are slender and covered with smooth brown bark slightly tinged with red, and in their second year produce slender spinescent lateral branchlets, and are light brown and marked by occasional orange-colored lenticels. The winter-buds are obtuse, and one sixteenth of an inch long, their outer scales chestnut-brown and slightly pubescent, with ciliate scarious margins, the inner ones oblong, acute, coated with long pale hairs, accrescent with the young shoots, and a quarter of an inch long when fully grown. The leaves are lanceolate-oblong, acute or rounded and apiculate at the apex, acute at the base, and coarsely crenulate-serrate above the middle or sometimes almost entire; when they appear they are more or less coated with pale tomentum on the lower surface, and are pilose on the upper surface, and at maturity are subcoriaceous, dark green and lustrous above, paler below, and glabrous or nearly so, with slender midribs grooved on the upper side and obscure primary veins; they are then an inch and a half to three inches long and one half of an inch to an inch and a half broad, and are borne on slender rigid glabrous or puberulous petioles from three quarters of an inch to an inch in length. The stipules are filiform, rose-colored, half an inch long, and caducous. The flowers, which are an inch across when expanded, and very fragrant, appear from the end of March in Louisiana to the middle of May in Pennsylvania, and are produced in few-flowered umbels on slender pedicels an inch to an inch and a half in length, furnished near the middle with one or more inconspicuous glands, and are glabrous or sometimes, especially in the Gulf states, covered with pale tomentum. The calyx-tube is glabrous, pubescent, or tomentose on the outer surface, with narrow acuminate lobes, terminating in rigid points, and clothed on the inner surface with pale tomentum. The petals are distant, narrowly obovate, rounded above, contracted below into long slender claws, undulate and sometimes irregularly denticulate-serrate at the base of the blade, and white, pink, or rose-colored. The ovary and the lower part of the styles are densely clothed with pale

tomentum. The fruit is depressed-globose or sometimes slightly pyriform, and is from three quarters of an inch to an inch in diameter, pale yellow-green, and very fragrant when fully ripe, with hard acid flesh.

Pyrus angustifolia is distributed from Allegheny County, Pennsylvania,[1] and southern Delaware through the coast region of the southern Atlantic states to the valley of the Chattahoochee in western Florida, and through the Gulf states to the valley of the Red River in Louisiana, and northward to middle Tennessee. In the Atlantic states, where it is more common than in the country west of the Alleghany Mountains, *Pyrus angustifolia* usually grows in open forest glades in stiff clay soil near streams, and in the Gulf states in the sandy soil of dry depressions in rolling Pine-covered uplands.

The wood of *Pyrus angustifolia* is heavy, hard, and close-grained; it is light brown tinged with red, with thick yellow sapwood and many obscure medullary rays. The specific gravity of the absolutely dry wood is 0.6895, a cubic foot weighing 42.97 pounds. It is occasionally employed for levers, the handles of tools, and other small objects.

The fruit is used for preserves and is occasionally made into cider.

It was this tree, no doubt, that William Strachey found on the James River in 1610,[2] although it was not recognized by botanists until nearly the end of the next century, the earliest description having been drawn up from trees cultivated in England, where it was introduced in 1750[3] by Christopher Gray.[4]

The southern Crab-apple is occasionally cultivated in the gardens of Europe. When in flower it is not surpassed in beauty by any of the small trees of North America, and the traveler in the gloomy and monotonous Pine forests of the southern states experiences no more delightful sensation than when he comes unexpectedly into some retired glade and finds it filled with these trees covered by their delicate and fragrant flowers.

[1] *Pyrus angustifolia* was first noticed here by Professor Thomas C. Porter.

[2] "Crabb trees there be, but the fruict small and bitter, howbeit, being graffed upon, soone might we have of our owne apples of any kind, peares, and what ells." (*Historie of Travaile into Virginia Britannia*, ed. Major, 130.)

[3] Aiton, *Hort. Kew.* ii. 176. — Loudon, *Arb. Brit.* ii. 909, t.

[4] Christopher Gray established a nursery-garden at Fulham early in the eighteenth century, and appears to have been active in introducing North American plants, for Mark Catesby, in the preface to the *Hortus Britanno-Americanus*, published in 1767, remarks that "Mr. Gray at Fulham has for many years made it his business to raise and cultivate the plants of America (from whence he has annually fresh supplies) in order to furnish the Curious with what they want;" and that, "through his industry and skill a greater variety of American forest-trees and shrubs may be seen in his gardens, than in any other place in England." According to Loudon, the first plant of *Magnolia fœtida* which was brought to England was planted in Gray's nursery; it died in 1810, when it had formed a head twenty feet in diameter and a trunk nearly five feet in circumference (*Arb. Brit.* i. 76).

In 1755 Gray published a catalogue of the plants cultivated in his garden, which is supposed to have been written by Philip Miller.

EXPLANATION OF THE PLATE.

Plate CLXIX. Pyrus angustifolia.

1. A flowering branch, natural size.
2. Vertical section of a flower, parts of the stamens and petals removed, enlarged.
3. A fruiting branch, natural size.
4. Vertical section of a fruit, natural size.
5. A winter branchlet, natural size.

C.E. Faxon del. Picart fr. sc.

PYRUS ANGUSTIFOLIA, Ait.

A. Riocreux dirext. Imp. R. Taneur, Paris.

PYRUS RIVULARIS.

Oregon Crab Apple.

LEAVES ovate-lanceolate, serrulate, often 3-lobed, pubescent on the lower surface.

Pyrus rivularis, Douglas; Hooker, *Fl. Bor.-Am.* i. 203, t. 68. — Don, *Gen. Syst.* ii. 647. — Torrey & Gray, *Fl. N. Am.* i. 471. — Walpers, *Rep.* ii. 53. — Dietrich, *Syn.* iii. 154. — Ledebour, *Fl. Ross.* ii. 99. — Nuttall, *Sylva*, ii. 22, t. 49. — Torrey, *Bot. Wilkes Explor. Exped.* 292. — Koch, *Dendr.* i. 212. — Wenzig, *Linnæa*, xxxviii. 38. — Brewer & Watson, *Bot. Cal.* i. 188. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 73.

Pyrus diversifolia, Bongard, *Mém. Acad. Sci. St. Pétersbourg*, ser. 6, ii. 133.

Pyrus fusca, Rafinesque, *Med. Fl.* ii. 254.

Pyrus subcordata, Ledebour, *Fl. Ross.* ii. 95.

Malus rivularis, Roemer, *Fam. Nat. Syn.* iii. 215. — Decaisne, *Nouv. Arch. Mus.* x. 155.

Malus diversifolia, Roemer, *Fam. Nat. Syn.* iii. 215. — Decaisne, *Nouv. Arch. Mus.* x. 155.

Malus subcordata, Roemer, *Fam. Nat. Syn.* iii. 192.

Pyrus rivularis, *β.* **levipes**, Nuttall, *Sylva*, ii. 24.

A tree, thirty to forty feet in height, with a trunk twelve to eighteen inches in diameter; or often a shrub sending up from the ground many slender stems. The bark of the trunk is a quarter of an inch thick, the surface broken into large rather thin loose light red-brown plate-like scales. The winter-buds are obtuse, one sixteenth of an inch long, and covered by chestnut-brown scales rounded on the back and ciliate on the margins; the accrescent scales of the inner rows being lanceolate-acute when fully grown, usually bright red, and nearly half an inch long. The branches are at first coated with long pale hairs which are sometimes deciduous, and sometimes cover them more or less completely until the autumn; in their first winter they become bright red and lustrous, and later are dark brown and often marked by minute remote pale lenticels. The leaves are ovate-lanceolate, acute or acuminate at the apex, wedge-shaped or rounded at the base, sharply serrate with appressed glandular teeth, and occasionally, especially on vigorous shoots, obscurely three-lobed, with prominent midribs and primary veins grooved on the upper side, and conspicuously reticulate veinlets; when they unfold they are pubescent on the lower, and puberulous on the upper surface, and at maturity are thick and firm, dark green and glabrous above, and pale and slightly pubescent below, an inch to three inches long, and half an inch to an inch and a half broad, and are borne on stout rigid pubescent petioles an inch to an inch and a half in length. The stipules are narrowly lanceolate, acute, from one half to three quarters of an inch long, and caducous. In the autumn the leaves assume beautiful shades of orange and scarlet. The flowers, which are produced in short racemose many-flowered cymes leafy at the base, are borne on slender pubescent pedicels biglandular near the middle, and are half an inch across when expanded; the calyx-tube is narrowly obconic and glabrous or puberulous, with acute lobes, minutely apiculate, coated with dense pale tomentum on the inner surface, and deciduous from the mature fruit; the petals are orbicular to obovate, with erose or undulate margins; they are contracted below into short claws, and are as long as the two to four glabrous styles. The fruit, which ripens in September and October, is obovate-oblong, and from one half to three quarters of an inch in length, with thin dry flesh and large seeds; on some trees it is yellow-green when fully ripe, and on others it is light yellow with a red flush on one side, or sometimes is almost entirely red.

Pyrus rivularis is distributed from the Aleutian Islands southward along the coast and islands of Alaska and British Columbia[1] and through western Washington and Oregon to Sonoma and Plumas

[1] Richardson, *Arctic Searching Exped.* ii. 294. — Rothrock, *Smithsonian Rep.* 1867, 435 (*Fl. Alaska*). — G. M. Dawson, *Canadian Nat.* n. ser. ix. 330.

Counties, California.[1] It grows usually in deep rich soil in the neighborhood of streams, often forming almost impenetrable thickets of considerable extent, and attains its greatest size in the valleys of Washington and Oregon.

The wood of *Pyrus rivularis* is heavy, hard, and very close-grained, with a satiny surface susceptible of receiving a beautiful polish; it contains numerous obscure medullary rays, and is light brown tinged with red, with thick lighter colored sapwood composed of twenty-five to thirty layers of annual growth. The specific gravity of the absolutely dry wood is 0.8316, a cubic foot weighing 51.83 pounds. It is employed for mallets, malls, the handles of tools, and the bearings of machinery.

The fruit, which has a pleasant subacid flavor when fully ripe, is gathered and consumed by the Indians.[2]

Archibald Menzies,[3] who sailed with Vancouver as surgeon and naturalist late in the last century, appears to have been the first botanist to notice *Pyrus rivularis*, although its character was not distinguished until fifty years later.[4] In 1882 it was introduced from Oregon into the Arnold Arboretum, where it is perfectly hardy and flowers abundantly every year.[5]

[1] Greene, *Fl. Francis.* i. 53.

[2] "The fruit of the Crab-apple (*Pyrus rivularis*) is prepared for food by being wrapt in leaves and preserved in bags all winter. When the apples have become sweet, they are cooked by digging a hole in the ground, covering it over thickly with green leaves and a layer of earth or sand, and then kindling a fire above them." (R. Brown (Campst.), *Trans. Bot. Soc. Edinburgh*, ix. 383.)

[3] See ii. 90.

[4] Probably the earliest printed reference to this tree is in Georgi's *Geographisch-Physikalische und Naturhistorische Beschreibung des Russischen Reichs* (pt. iii. iv. 1015), published in 1800, where the wild Apple-tree seen by Schelechow on the Aleutian Islands is mentioned, but is regarded as a variety of the common Apple-tree.

[5] *Pyrus rivularis* is exceedingly rare in European gardens, and does not appear to have attracted the attention of European horticulturists. It is cultivated, however, in the garden of the Forest School at Münden, where it flowers and produces fruit.

EXPLANATION OF THE PLATE.

Plate CLXX. Pyrus rivularis.

1. A flowering branch, natural size.
2. Vertical section of a flower, the petals removed, enlarged.
3. Cross section of an ovary, enlarged.
4. A fruiting branch, natural size.
5. A fruit divided transversely, enlarged.
6. A winter branchlet, natural size.

C.E. Faxon del. Picart fr. sc.

PYRUS RIVULARIS, Dougl.

A. Riocreux direx.t Imp. R. Taneur, Paris.

PYRUS AMERICANA.

Mountain Ash.

LEAFLETS lanceolate, acuminate.

Pyrus Americana, De Candolle, *Prodr.* ii. 637. — Watson, *Dendr. Brit.* i. 54, t. 54. — Sprengel, *Syst.* ii. 511. — Hooker, *Fl. Bor.-Am.* i. 204. — Don, *Gen. Syst.* ii. 648. — Audubon, *Birds*, t. 363. — Torrey & Gray, *Fl. N. Am.* i. 472. — Torrey, *Fl. N. Y.* i. 224. — Dietrich, *Syn.* iii. 155. — Nuttall, *Sylva*, ii. 25, t. 50. — Emerson, *Trees Mass.* 439. — Lange, *Pl. Grœnl.* 134. — Provancher, *Flore Canadienne*, i. 209. — Chapman, *Fl.* 129. — Curtis, *Rep. Geolog. Surv. N. Car.* 1860, iii. 70. — Brewer & Watson, *Bot. Cal.* i. 189. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 73. — Watson & Coulter, *Gray's Man.* ed. 6, 164.

Sorbus Americana, Marshall, *Arbust. Am.* 145. — Willdenow, *Enum.* 520. — Pursh, *Fl. Am. Sept.* i. 341. — Poiret, *Lam. Dict.* Suppl. v. 164. — Nuttall, *Gen.* i. 305. — Hayne, *Dendr. Fl.* 75. — Spach, *Hist. Vég.* ii. 95. — Bigelow, *Fl. Boston.* ed. 3, 207. — Roemer, *Fam. Nat. Syn.* iii. 138. — Koch, *Dendr.* i. 190. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xix. 174 (*Mél. Biol.* ix. 171). — Wenzig, *Linnæa*, xxxviii. 71. — Decaisne, *Nouv. Arch. Mus.* x. 158.

Sorbus aucuparia, Poiret, *Lam. Dict.* vii. 234 (in part). — Bigelow, *Fl. Boston.* 119. — Decaisne, *Nouv. Arch. Mus.* x. 158 (in part).

Sorbus aucuparia, var. **Americana**, Persoon, *Syn.* ii. 38.

Pyrus aucuparia, Meyer, *Pl. Lab.* 81 (in part). — Schlechtendal, *Linnæa*, x. 99 (not Gærtner). — Hooker f. *Trans. Linn. Soc.* xxiii. 290, 327 (*Distribution Arctic Pl.*), in part.

A tree, twenty to thirty feet in height, with a trunk which rarely exceeds a foot in diameter, spreading slender branches, and stout branchlets; or more often a tall or sometimes a low shrub sending up many stems from the ground. The bark of the trunk is an eighth of an inch thick, with a smooth light gray surface irregularly broken by small appressed plate-like scales. The branchlets are slightly clothed at first with fine pubescence, but soon become glabrous, and in their first winter are brown tinged with red, marked by the large leaf-scars and remote pale oblong lenticular spots, and often covered with a faint glaucous bloom; in their second year they become darker, and the thin papery outer layer of bark is easily separable from the bright green and fragrant inner layers. The winter-buds are acute, from one quarter to three quarters of an inch long, and protected by dark vinous red acuminate scales rounded on the back, more or less pilose, and covered with a gummy exudation; the inner scales are coated in the bud with thick pale tomentum and enlarge with the growing shoots which, in falling, they mark with enduring narrow ring-like scars. The leaves are six to eight inches long, with slender grooved dark green or red petioles often furnished with tufts of dark hairs at the base of the petiolules and enlarged at the base, and from thirteen to seventeen leaflets; these are lanceolate, acute, taper-pointed, unequally wedge-shaped or rounded and entire at the base, and sharply serrate above, with acute often glandular teeth; they are sessile or shortly petiolulate, or the terminal one is sometimes borne on a stalk half an inch in length; when they unfold they are slightly pubescent on the lower surface, and at maturity are membranaceous, glabrous, dark yellow-green on the upper, and pale on the under surface, two to three inches long, and one half to two thirds of an inch broad, with prominent midribs grooved on the upper side, and thin veins. The stipules are broad and foliaceous, nearly triangular, variously cut, and caducous. The leaves turn a bright clear yellow before falling. The flowers, which appear after the leaves are fully grown toward the end of May or as late as July at the north and on the high Alleghany Mountains, are one eighth of an inch in diameter when expanded, and are borne on short stout pedicels in flat compound cymes three or four inches across. The bracts and bractlets are acute, minute, and caducous. The calyx is broadly obconic and puberulous, with short nearly triangular lobes tipped with minute glands, and half the length of the nearly orbicular creamy white petals which are contracted below into short claws. The fruit is a quarter of an inch

across, subglobose or slightly pyriform, and bright red, with thin acid flesh, a thick rather woody endocarp, and light chestnut-colored seeds rounded at the apex, acute at the base, more or less flattened by mutual pressure, and one eighth of an inch long. It ripens late in the autumn, and, unless eaten by birds, remains on the tree until the end of winter, when it separates from the stems, which often remain on the branches until the leaf-buds open in the spring.

Pyrus Americana is distributed from Newfoundland to Manitoba,[1] and extends southward through the maritime provinces of Canada, Quebec, and Ontario, the elevated portions of the northeastern United States, the region of the Great Lakes, and the high mountain ranges of Virginia and North Carolina. It is abundant in all the eastern provinces of Canada, where it grows in rich rather moist soil along the borders of swamps and on rocky hillsides, and probably attains its largest size on the northern shores of Lakes Huron and Superior; in the United States, except in northern New England, it is more often a shrub than a tree, growing usually on the Alleghany Mountains in the form of a low bush with narrower foliage and smaller fruit than the tree bears at the north.[2]

The wood of *Pyrus Americana* is close-grained, but light, soft, and weak; it is pale brown, with pale lighter colored sapwood composed of fifteen to twenty layers of annual growth, and contains numerous obscure medullary rays. The specific gravity of the absolutely dry wood is 0.5451, a cubic foot weighing 33.97 pounds.

The fruit of the American Mountain Ash is as astringent as that of the Old World species, contains the same principles, and can be used for the same purposes; in the United States it is sometimes employed domestically in infusions and decoctions,[3] and in homœopathic remedies.[4]

Pyrus Americana was first distinguished by Humphrey Marshall, the Pennsylvania botanist, who described it in his *Arbustum Americanum* in 1785,[5] although it is said to have been introduced into English gardens three years earlier.[6] It is sometimes planted in Canada and in the northern United States in the neighborhood of houses on account of the beauty of its fruit. This, however, is smaller and less highly colored than that of the second North American and of the European species.

[1] Brunet, *Cat. Vég. Lig. Can.* 26. — Bell, *Rep. Geolog. Surv. Can.* 1879–80, 54°. — Macoun, *Cat. Can. Pl.* i. 146.

[2] *Pyrus Americana*, var. *microcarpa*, Torrey & Gray, *Fl. N. Am.* i. 472. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 74.

Sorbus aucuparia, var. α., Michaux, *Fl. Bor.-Am.* i. 290.

Sorbus microcarpa, Pursh, *Fl. Am. Sept.* i. 341. — Poiret, *Lam. Dict.* Suppl. v. 164. — Elliott, *Sk.* i. 555. — Spach, *Hist. Vég.* ii. 95. — Roemer, *Fam. Nat. Syn.* iii. 138.

Pyrus microcarpa, Sprengel, *Syst.* ii. 511. — De Candolle, *Prodr.* ii. 636. — Don, *Gen. Syst.* ii. 648. — Loudon, *Arb. Brit.* ii. 921. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 71.

Sorbus Americana, var. *microcarpa*, Wenzig, *Linnæa*, xxxviii. 73.

Sorbus riparia, Rafinesque, *New Fl.* iii. 15.

[3] Rafinesque, *Med. Fl.* ii. 265. — Stillé & Maisch, *Nat. Dispens.* ed. 2, 1333.

[4] Millspaugh, *Am. Med. Pl. in Homœopathic Remedies*, i. 56, t. 56.

[5] John Josselyn includes in his list of plants mentioned in *New England's Rarities* the "Quick Beam or Wild Ash." This has been supposed to be the American Mountain Ash (see ed. Tuckerman, 98), and, although Josselyn probably never visited the part of New England where this tree grows naturally, he may well have learned of its existence from the Indians, who doubtless made use of the fruit.

[6] Loudon, *Arb. Brit.* ii. 920, t.

EXPLANATION OF THE PLATES.

PLATE CLXXI. PYRUS AMERICANA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. An ovary divided transversely, enlarged.
4. Portion of a young branch showing stipules, natural size.

PLATE CLXXII. PYRUS AMERICANA.

1. A fruiting branch, natural size.
2. Vertical section of a fruit, enlarged.
3. Cross section of a fruit, enlarged.
4. Vertical section of a seed, enlarged.
5. An embryo, much magnified.
6. A winter-bud, natural size.

C.E. Faxon del.

Picart fr. sc.

PYRUS AMERICANA, DC.

A. Riocreux dirext.

Imp. R. Taneur, Paris.

C.E.Faxon del.

Picart fr. sc.

PYRUS AMERICANA, DC.

A.Riocreux direx.t

Imp. R.Taneur, Paris.

PYRUS SAMBUCIFOLIA.

Mountain Ash.

LEAFLETS oblong-ovate to lance-ovate, mostly obtuse.

Pyrus sambucifolia, Chamisso & Schlechtendal, *Linnæa*, ii. 36. — Don, *Gen. Syst.* ii. 648. — Torrey & Gray, *Fl. N. Am.* i. 472. — Walpers, *Rep.* ii. 53. — Dietrich, *Syn.* iii. 155. — Watson, *King's Rep.* v. 92. — Brewer & Watson, *Bot. Cal.* i. 189. — Sargent, *Forest Trees N. Am. 10th Census U. S.* ix. 74. — Watson & Coulter, *Gray's Man.* ed. 6, 164.

Sorbus aucuparia, var. *β.*, Michaux, *Fl. Bor.-Am.* i. 290.

Sorbus aucuparia, Schrank, *Pfl. Lab.* 25 (in part; not Linnæus).

Pyrus Americana, Newberry, *Pacific R. R. Rep.* vi. 73 (not De Candolle). — Cooper, *Pacific R. R. Rep.* xii. pt. ii. 60. — Torrey, *Bot. Wilkes Explor. Exped.* 292.

Pyrus aucuparia, Meyer, *Pl. Lab.* 81 (in part). — Schlechtendal, *Linnæa*, x. 99 (in part). — Hooker, *Trans. Linn. Soc.* xxiii. 290, 327 (in part).

Sorbus sambucifolia, Roemer, *Fam. Nat. Syn.* iii. 139. — Wenzig, *Linnæa*, xxxviii. 73. — Decaisne, *Nouv. Arch. Mus.* x. 159.

Sorbus Sitchensis, Roemer, *Fam. Nat. Syn.* iii. 139.

A tree, occasionally thirty feet in height, with a trunk sometimes a foot in diameter, and spreading branches which form a round handsome head; or often on the mountains of western America a low shrub. The bark of the trunk is a quarter of an inch thick, with a smooth gray satiny surface sometimes broken by small appressed scales. The branchlets are at first glabrous, pubescent, or pilose with long pale hairs, and in their first winter are brown tinged with red and are marked by scattered oblong lenticular spots. The winter-buds are acute, often three quarters of an inch to an inch in length, and in the shape, color, and texture of the scales which cover them hardly distinguishable from those of *Pyrus Americana*. The leaves are four to six inches long, with stout grooved and usually bright red petioles often tufted with dark hairs at the base of the petiolules, and seven to thirteen oblong-oval or lance-ovate leaflets; these are generally blunt and rounded, or abruptly short-pointed, or acuminate at the apex, unequally wedge-shaped at the base, entire or undulate below, and sharply and often doubly serrate above the middle, with spreading and sometimes glandular teeth; when they unfold they are pubescent on the lower surface, and at maturity are glabrous, dark green above, and pale below, with inconspicuous midribs and veins, and are sessile or short-petiolulate, or the terminal one long-stalked, and an inch and a half to two inches in length and one half to three quarters of an inch in breadth. The stipules are lanceolate to triangular, foliaceous, from one half to three quarters of an inch long, and early deciduous. The leaves turn a deep orange-color in the autumn before falling. The flowers, which appear in the early part of July, are produced in small dense pubescent cymes two to three inches across; they are a quarter of an inch in diameter when fully expanded, and are borne on slender clavate pedicels twice the length of the obconic calyx; this is glabrous or puberulous on the outer surface with narrow acute rigidly pointed lobes ciliate on the margins and much shorter than the obovate petals which are rounded above and contracted below into short claws. The fruit is subglobose, bright scarlet, and sometimes nearly half an inch in diameter, and is produced in dense red-branched clusters.

Pyrus sambucifolia is distributed from southern Greenland[1] to Labrador[2] and the high mountains of northern New England, and ranges westward along the northern shores of the Great Lakes to those of Little Slave Lake, through the Rocky Mountains to Alaska[3] and Kamschatka,[4] and through

[1] Hooker f. *Trans. Linn. Soc.* xxiii. 290, 327 (*Distribution Arctic Pl.* ii.).

[2] Meyer, *Pl. Lab.* 81.

[3] Bongard, *Mém. Acad. Sci. St. Pétersbourg*, ser. 6, ii. 133. — Rothrock, *Smithsonian Rep.* 1867, 446 (*Fl. Alaska*). — Macoun, *Cat. Can. Pl.* i. 146.

[4] Ledebour, *Fl. Ross.* ii. 99.

northeastern Asia[1] and the Kurile Islands[2] to Japan,[3] extending south in western America along all the mountain ranges of the interior[4] and western part of the continent to southern New Mexico, and to the neighborhood of the Yosemite valley in central California.[5] It inhabits the margins of cold wet alpine swamps and the borders of streams, and probably attains its greatest size in northern New England, where it grows at higher elevations above the level of the sea than *Pyrus Americana*, and in the region immediately north and west of Lake Superior.

The wood of *Pyrus sambucifolia* is close-grained but soft, light, and weak; it is light brown, with thin lighter colored sapwood and obscure medullary rays. The specific gravity of the absolutely dry wood is 0.5928, a cubic foot weighing 36.94 pounds.

Pyrus sambucifolia was first distinguished by the French botanist Michaux, who found it in Canada late in the last century. In cultivation it has been usually confounded with *Pyrus Americana*, from which it is best distinguished by its smaller cymes, its larger and later flowers and much larger fruit, and its usually more obtuse and broader leaflets. The large and brilliant fruit of this tree makes it the handsomest of all the Mountain Ashes, and it is a common ornament of gardens in northern Vermont and New Hampshire and in northern Michigan, Wisconsin, and Minnesota, where it often grows to a large size and during the autumn and early winter is a conspicuous and beautiful object.[6]

[1] Trautvetter & Meyer, *Fl. Ochot.* 37. — Maximowicz, *Prim. Fl. Amur.* 103.

[2] Miyabe, *Mem. Bost. Soc. Nat. Hist.* iv. 232 (*Fl. Kurile Islands*).

[3] Franchet & Savatier, *Enum. Pl. Jap.* i. 140. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xix. 174 (*Mél. Biol.* ix. 171).

[4] Coulter, *Man. Rocky Mt. Bot.* 89.

[5] The subalpine form of the high mountains of Washington, Oregon, and California, a low shrub with small cymes and with leaves composed of seven to eleven oblong or elliptic-obovate leaflets usually serrate only towards the apex, has been regarded as a distinct species (*Sorbus pumila*, Rafinesque, *Med. Fl.* ii. 265. — *Pyrus occidentalis*, Watson, *Proc. Am. Acad.* xxiii. 263 [*Sorbus occidentalis*, Greene, *Fl. Francis.* i. 54]), but intermediate forms appear to connect it with the northern and eastern tree, and it is perhaps better to consider it a variety of that species (var. *pumila*) until the American Mountain Ashes, which should perhaps be considered geographical varieties of one widely distributed species, are better understood than they are at present.

[6] *Pyrus sambucifolia* requires a northern climate with long cold winters to develop all its beauties, and it does not flourish even in eastern New England, where it is a less beautiful plant than the Old World Mountain Ash.

EXPLANATION OF THE PLATES.

PLATE CLXXIII. PYRUS SAMBUCIFOLIA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. An ovary divided transversely, enlarged.
4. Portion of a young branch showing stipules, natural size.

PLATE CLXXIV. PYRUS SAMBUCIFOLIA.

1. A fruiting branch, natural size.
2. Vertical section of a fruit, enlarged.
3. Cross section of a fruit, enlarged.
4. Vertical section of a seed, enlarged.
5. An embryo, much magnified.
6. Winter-buds, natural size.

C.E.Faxon del.

Picart fr. sc.

PYRUS SAMBUCIFOLIA, Cham. et Schlecht.

A.Riocreux direx.t

Imp. R.Taneur, Paris.

C.E. Faxon del.

Picart fr. sc.

PYRUS SAMBUCIFOLIA, Cham et Schlecht.

A. Riocreux direx.t

Imp. R. Taneur, Paris.

CRATÆGUS.

Flowers regular, perfect; calyx 5-lobed, the lobes imbricated in æstivation; petals 5, imbricated in æstivation; stamens usually 10 to 20; ovary 1 to 5-celled; ovules 2 in each cell, ascending. Fruit a drupaceous pome with bony nutlets. Leaves alternate, simple, lobed or pinnatifid.

Cratægus, Linnæus, *Gen.* 143. — Adanson, *Fam. Pl.* ii. 296. — A. L. de Jussieu, *Gen.* 335. — Meisner, *Gen.* 106. — Endlicher, *Gen.* 1239. — Bentham & Hooker, *Gen.* i. 626. — Baillon, *Hist. Pl.* i. 475.

Oxyacantha, Ruppius, *Fl. Jen.* ed. 3, 136. — Medicus, *Phil. Bot.* i. 150.

Halmia, Roemer, *Fam. Nat. Syn.* iii. 101.

Anthomeles, Roemer, *Fam. Nat. Syn.* iii. 102.

Phænopyrum, Roemer, *Fam. Nat. Syn.* iii. 103.

Phalacros, Wenzig, *Linnæa*, xxxviii. 164.

Trees or shrubs, with scaly bark, rigid terete and usually armed branches, small winter-buds covered by imbricated scales, those of the inner rows accrescent and often colored, and fibrous roots. Leaves alternate, petiolate, conduplicate in vernation, simple, and generally serrate or more or less lobed or pinnatifid, membranaceous or coriaceous, commonly deciduous; stipules often glandular-serrate, deciduous, lanceolate, acuminate, minute, or, on vigorous shoots, ample, foliaceous, usually lunate and stalked. Flowers pedicellate, in cymose panicled or slightly racemose corymbs, terminal on leafy lateral branches developed from the axils of leaves of the previous year. Bracts and bractlets linear, caducous, often colored, in falling marking the slender branches of the inflorescence and the pedicels with persistent gland-like scars. Calyx-tube urceolate or campanulate, five-lobed or divided, the lobes reflexed after anthesis, entire or glandular-serrate, persistent or deciduous. Disk adnate to the interior of the calyx-tube, thin or fleshy, entire, lobed or slightly sulcate, concave or somewhat convex. Petals five, inserted on the margin of the disk in the mouth of the calyx-tube, orbicular, spreading, entire or sinuate margined, white or rose-colored. Stamens ten to twenty, or indefinite, inserted with the petals in one to three rows; filaments filiform, subulate, incurved, often persistent on the ripe fruit; anthers oblong, attached on the back below the middle, introrse, two-celled, the cells opening longitudinally, pale, rose-colored, or violet-purple. Ovary inferior, composed of one to five carpels inserted in the bottom of the calyx-tube and united with it; styles terminal, contracted or slightly spreading, free, persistent on the ripe nutlets; stigmas terminal, dilated, truncate; ovules two in each cell, ascending, collateral, anatropous; raphe dorsal, the micropyle inferior. Fruit drupaceous, ovate or globose, red, yellow, or black, usually somewhat open or concave at the summit; sarcocarp dry and mealy; endocarp composed of one to five one-celled slightly united nutlets, variously sulcate and, when more than one, flattened on the inner faces by mutual pressure. Seeds solitary by the abortion of one of the ovules, erect, compressed, exalbuminous; testa membranaceous. Embryo filling the cavity of the seed; cotyledons plano-convex; radicle short, inferior.

Cratægus is widely and generally distributed through the temperate regions of the northern hemisphere. About forty species, nearly equally divided between the Old World and the New, can be distinguished. Fourteen are found within the territory of the United States, a larger number of species occurring in the region between the Red and the Trinity Rivers in western Louisiana and eastern Texas than in any other district of similar extent.[1] Three species at least occur in Mexico,[2] and of these

[1] This region, which is one of the most interesting in North America for the student of trees, must be considered the headquarters of the genus Cratægus, which makes here a conspicuous feature of the vegetation. More species occur here together than anywhere else, individuals of several of them growing to a greater size and in greater numbers than in any other part of the country.

[2] Hemsley, *Bot. Biol. Am. Cent.* i. 379.

one[1] ranges southward to the mountains of Ecuador, the most southern country which any member of the genus is known to reach. In Europe, where Cratægus is distributed from Scandinavia to the shores of the Mediterranean and from the Atlantic to the Black Sea, fourteen species are now generally recognized;[2] in the Orient[3] six endemic species are known; two occur in the Himalayan regions of central Asia,[4] and three in China and Japan.[5]

Cratægus has few useful properties. The wood of all the species is heavy, hard and solid, and is sometimes used for levers, the handles of tools, and other small articles.[6] In the United States the fruit of some of the species is made into jellies and preserves, and in northern China the fruit of *Cratægus pinnatifida*[7] is employed for the same purpose.[8] The Old World *Cratægus Oxyacantha*,[9] the most widely distributed plant of the genus, is sometimes cultivated in Afghanistan and the northwestern Himalayas as a fruit-tree,[10] and in some parts of Europe its fruit is fermented and used to strengthen cider and perry.[11] Many of the species are esteemed as ornamental plants, and *Cratægus Oxyacantha*, with its numerous varieties developed in cultivation, has been for centuries a favorite park and hedge plant in Europe.[12]

The American species of Cratægus are preyed upon by numerous insects,[13] and are often injured by serious fungal diseases.[14]

The generic name, from κράτος, refers to the strength of the wood produced by the different species.

[1] *Cratægus stipulosa*, Steudel, *Nom. Bot.* ed. 2, i. 434.

Mespilus stipulosa, Humboldt, Bonpland & Kunth, *Nov. Gen. et Spec.* vi. 213. — Kunth, *Syn. Pl. Æquin.* iii. 462.

[2] Nyman, *Conspect. Fl. Europ.* 243.

[3] Boissier, *Fl. Orient.* ii. 660.

[4] Hooker f. *Fl. Brit. Ind.* ii. 383.

[5] Franchet & Savatier, *Enum. Pl. Jap.* i. 140. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg.* xix. 176 (*Mél. Biol.* ix. 175). — Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 259.

[6] The wood of *Cratægus Oxyacantha* has been found the best substitute for Boxwood in wood-engraving (Jackson, *Commercial Botany of the 19th Century*, 156).

[7] Bunge, *Mém. Sav. Étr. St. Pétersbourg*, ii. 100 (*Enum. Pl. Chin. Bor.* 26). — Franchet, *Pl. David.* 118. — Maximowicz, *l. c.* — Forbes & Hemsley, *l. c.*

[8] Bretschneider, *Early European Researches into the Flora of China*, 127.

[9] Linnæus, *Spec.* 477. — De Candolle, *Prodr.* ii. 628. — Boissier, *l. c.* 664. — Hooker f. *l. c.*

[10] Brandis, *Forest Fl. Brit. Ind.* 207.

[11] Loudon, *Arb. Brit.* ii. 837.

[12] *Cratægus Oxyacantha* is widely and generally distributed through the forests of Europe and central Asia; for many centuries it has been cultivated in Europe as a hedge plant, for which purpose it is fitted by its rigid and well-armed branches, and Hawthorn hedges are common in all parts of Great Britain, where, too, this tree is a conspicuous and beautiful feature in all parks and many gardens. (See Loudon, *l. c.*) The Hawthorn was early introduced into the United States, but the heat and dryness of our summers cause the growth of many fungal enemies on its foliage and fruit, and its beauty is thus destroyed early in the season.

[13] American Hawthorns are attacked by many insects which prey particularly on their foliage. Packard (*5th Rep. U. S. Entomolog. Comm.* 1886–1890, 532) enumerates forty-six species which afflict the trees of this genus in the United States; these have been noted chiefly in the eastern part of the continent. Tent-caterpillars, Fall Web-worms, and Canker-worms sometimes infest our Hawthorns to such an extent as to make them a danger to neighboring orchards. Most of the insects which live upon Prunus and Pyrus attack Hawthorns also, in addition to other species which are peculiar to them. The larvæ of several species of Catocala have been found feeding on these trees as well as a number of leaf-miners, among which are *Nepticula cratægifoliella*, Clemens, *Ornix cratægifoliella*, Clemens, *Lithocolletis cratægella*, Clemens, and others. Aphids and mites also affect the foliage, and the trunks are often injured by Apple-tree Borers. Certain species of Curculio, like *Anthonomus Cratægi*, Walsh, *Conotrachelus Naso*, Leconte, and *Conotrachelus posticatus*, Say, live within the fruit.

[14] Different *Ræsteliæ* occur on the fruit and young branches of most of the American species of Cratægus as well as on Pyrus and Amelanchier, and a Cluster Cup, *Ræstelia pyrata*, Thaxter, makes rings on the under surface of the leaves of several species. Among other fungi which attack Cratægus are *Entomosporium maculatum*, Levéillé, with curious ciliated spores, and most of the species which attack Pyrus can be found also on Cratægus.

CONSPECTUS OF THE NORTH AMERICAN SPECIES.

Flowers in ample many-flowered corymbs.
- Fruit subglobose, black or blue.
  - Leaves broadly obovate to oblong-ovate . . . . . 1. C. DOUGLASII.
  - Leaves lanceolate-oblong to ovate . . . . . 2. C. BRACHYACANTHA.
- Fruit large, subglobose or pyriform, scarlet or rarely yellow.
  - Leaves subcoriaceous, obovate-cuneiform to broadly ovate or linear-oblong . . . . 3. C. CRUS-GALLI.
  - Leaves membranaceous, round-ovate, acutely incised, usually glabrous . . . . . 4. C. COCCINEA.
  - Leaves membranaceous, broadly ovate, acutely incised, pubescent on the lower surface . . . . . 5. C. MOLLIS.
  - Leaves ovate to ovate-oblong . . . . . 6. C. TOMENTOSA.
  - Leaves wedge-obovate, prominently veined . . . . . 7. C. PUNCTATA.
- Fruit small, depressed-globose, scarlet.
  - Leaves submembranaceous, spatulate or oblanceolate . . . . . 8. C. SPATHULATA.
  - Leaves broadly ovate or triangular . . . . . 9. C. CORDATA.
  - Leaves ovate to ovate-oblong or oblong-obovate . . . . . 10. C. VIRIDIS.
  - Leaves orbicular to broadly ovate, pinnately 5 to 7-cleft . . . . . 11. C. APIIFOLIA.

Flowers in simple few-flowered corymbs.
- Fruit pyriform or subglobose, red or greenish yellow.
  - Leaves cuneate-obovate or rhombic-obovate . . . . . 12. C. FLAVA.
  - Leaves obovate, spatulate . . . . . 13. C. UNIFLORA.
- Fruit red, globose.
  - Leaves elliptical to oblong-cuneiform . . . . . 14. C. ÆSTIVALIS.

CRATÆGUS DOUGLASII.

Haw.

FRUIT black. Leaves broadly obovate to oblong-ovate.

Cratægus Douglasii, Lindley, *Bot. Reg.* t. 1810. — Koch, *Dendr.* i. 147. — Kaleniczenko, *Bull. Mosc.* xlviii. pt. ii. 26. — Brewer & Watson, *Bot. Cal.* i. 189. — Engelmann, *Bot. Gazette*, vii. 128. — Sargent, *Forest Trees N. Am. 10th Census U. S.* ix. 75. — Greene, *Fl. Francis.* i. 53.

Cratægus punctata, var. **brevispina**, Douglas; Hooker, *Fl. Bor.-Am.* i. 201.

Cratægus sanguinea, var. **Douglasii**, Torrey & Gray, *Fl. N. Am.* i. 464. — Walpers, *Rep.* ii. 58. — Dietrich, *Syn.* iii. 160. — Wenzig, *Linnæa*, xxxviii. 135. — Torrey, *Bot. Wilkes Explor. Exped.* 292. — Regel, *Act. Hort. Petrop.* i. 116.

Cratægus sanguinea, Nuttall, *Sylva*, ii. 6, t. 44 (not Pallas). — Cooper, *Am. Nat.* iii. 407.

Anthomeles Douglasii, Roemer, *Fam. Nat. Syn.* iii. 140.

Cratægus rivularis, Brewer & Watson, *Bot. Cal.* i. 189 (not Nuttall). — Greene, *Fl. Francis.* i. 53.

A tree, thirty to forty feet in height, with a straight stout trunk eighteen inches to two feet in diameter, dividing into many branches which form a compact round head, and slender rigid branchlets; or often a tall shrub throwing up many stems, or, in the dry climate of the interior of the continent, a low intricately branched bush. The bark of the trunk is a quarter of an inch thick, longitudinally fissured, and broken into oblong plates, the surface of which separates into long thick dark red-brown scales. The branchlets are glabrous, green when young, and in their first winter bright red and lustrous, and marked by pale elevated lenticels; they are sometimes unarmed, but usually bear stout straight or slightly curved blunt or acute spines, three quarters of an inch to an inch in length, which are bright red in their first year, and, like the branches, later become ashy gray. The winter-buds are obtuse, one eighth of an inch long, and covered by broadly ovate scales which are keeled on the back, apiculate, ciliate on the margins, bright chestnut-brown, and lustrous. The leaves are broadly ovate to oblong-ovate, acute at the apex, gradually contracted at the base into short broad petioles, finely serrate except at the base with small glandular teeth, and often incisely cut towards the apex, or more or less three-lobed, especially on vigorous shoots; when they unfold they are puberulous on both surfaces, and at maturity are glabrous, thick, and rather coriaceous, dark green and often lustrous above, and paler below, one to four inches in length, and half an inch to an inch and a half in breadth. The stipules are narrowly obovate, acuminate, glandular-serrate, and caducous, or, on vigorous shoots, are foliaceous, broadly ovate-falcate, deeply incised, glandular-serrate, and short-stalked. The flowers are produced in broad or narrow leafy many-flowered cymes, furnished with lanceolate acuminate caducous bracts and bractlets; they appear in May when the leaves are nearly fully grown, and are from one third to one half of an inch across, with broadly obconic calyx-tubes, glabrous or puberulous, and nearly as long as the lanceolate calyx-lobes, which are acute or rounded at the apex, entire, ciliate-margined or finely glandular-serrate, and green or tinged with red or purple. The petals are pure white, broadly obovate, rounded above, and contracted below into short claws, and are rather longer than the stamens which have stout filaments and small pale anthers and than the short styles which vary in number from two to five, and are often furnished at the base with tufts of long pale hairs. The fruit, which falls as soon as it ripens in August and September, is subglobose or rarely somewhat oblong, black, and lustrous, with thin sweet flesh and small thin-walled nutlets slightly grooved on the back.

Cratægus Douglasii is distributed from the valley of the Parsnip River in British Columbia[1]

[1] Macoun, *Cat. Can. Pl.* i. 148.

through Washington and Oregon to the valley of the Pitt River in California, and ranges southward through Idaho and Montana to the valley of the Flat Head River at the western base of the Rocky Mountains. It is found in wet sandy soil in the neighborhood of streams, where it often forms impenetrable thickets of considerable extent, and is most abundant and attains its greatest size in the valleys of western Oregon and northern California.

The wood of *Cratægus Douglasii* is heavy, hard, tough, and close-grained, with a satiny surface susceptible of receiving a beautiful polish; it is rose-colored, with thick pale sapwood composed of thirty to forty layers of annual growth, and contains many thin medullary rays. The specific gravity of the absolutely dry wood is 0.6950, a cubic foot weighing 43.31 pounds. It is used for wedges, malls, and the handles of tools. The fruit, which is produced in great profusion, is a favorite article of food with the Indians.

In the dry interior parts of the continent *Cratægus Douglasii* is represented by the variety *rivularis*,[1] which, in its extreme form, is distinguished by narrowly lanceolate simply serrate membranaceous pale leaves; but in northern Montana, where the black-fruited Thorns abound, it passes into the form with larger thicker incisely cut leaves, the plants in one thicket often showing both the extreme and all the intermediate varieties of foliage ever produced by this tree.

Cratægus Douglasii, var. *rivularis*, is usually a low intricately branched armed or unarmed shrub. It is common in the coast region of Oregon, and is the usual form in the region bordering the shores of Puget Sound; it ranges southward to Sierra and Plumas Counties, California,[2] and extends over all the mountain ranges of eastern Oregon and Washington; it abounds on those of Idaho, Montana, and Utah, and spreads through Colorado[3] to the Pinos Altos Mountains of New Mexico, and grows along the borders of streams and mountain meadows, generally at high elevations.

Cratægus Douglasii was discovered by David Douglas[4] in the valley of the lower Colorado River, and in 1826 or 1827 was introduced by him into the garden of the London Horticultural Society, where it flowered ten years later.

In cultivation *Cratægus Douglasii* is a rapidly growing round-headed tree, soon attaining in good soil a height of eighteen or twenty feet; it is hardy on the Atlantic coast as far north as Nova Scotia, and in eastern Massachusetts covers itself every year with its handsome flowers and abundant black fruit.[5]

[1] Sargent, *Garden and Forest*, ii. 400.

Cratægus rivularis, Nuttall; Torrey & Gray, *Fl. N. Am.* i. 464. — Dietrich, *Syn.* iii. 161. — Walpers, *Rep.* ii. 58. — Nuttall, *Sylva*, ii. 9. — Regel, *Act. Hort. Petrop.* i. 107. — Watson, *King's Rep.* v. 92. — Engelmann, *Bot. Gazette*, vii. 128. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 74. — Macoun, *Cat. Can. Pl.* i. 522.

Mespilus rivularis, Wenzig, *Linnæa*, xxxviii. 137; *Bot. Centralbl.* xxxv. 342.

[2] Greene, *Fl. Francis.* i. 53.

[3] Coulter, *Man. Rocky Mt. Bot.* 88.

[4] See ii. 94.

[5] *Garden and Forest*, i. 201.

EXPLANATION OF THE PLATES.

Plate CLXXV. Cratægus Douglasii.

1. A flowering branch, natural size.
2. Diagram of a flower.
3. Vertical section of a flower, enlarged.
4. Front and back views of a stamen, enlarged.
5. An ovule, much magnified.
6. A fruiting branch, natural size.
7. A fruit with a part of the flesh removed, showing the nutlets, enlarged.
8. A nutlet natural size.
9. A nutlet divided transversely, enlarged.
10. Vertical section of a nutlet, enlarged.
11. A seed, enlarged.
12. An embryo, much magnified.
13. A leaf from a young shoot with stipules, natural size.
14. Winter-buds, natural size.

Plate CLXXVI. Cratægus Douglasii, *var.* rivularis.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. Cross section of a fruit, enlarged.
5. A nutlet, natural size.
6. A nutlet divided transversely, enlarged.

C.E. Faxon del. *Picart sc.*

CRATÆGUS DOUGLASII, Lindl.

A. Riocreux direx.t *Imp. R. Taneur, Paris.*

C.E. Faxon del

Rapine sc.

GRATÆGUS DOUGLASII, Var. RIVULARIS, Sarg.

A. Riocreux direx.t

Imp. R. Taneur, Paris.

CRATÆGUS BRACHYACANTHA.

Pomette Bleue. Hog's Haw.

FRUIT bright blue. Leaves lanceolate-oblong to ovate.

Cratægus brachyacantha, Sargent & Engelmann; Engelmann, *Bot. Gazette*, vii. 128. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 75. — Otto Kuntze, *Rev. Gen. Pl.* i. 215.

Cratægus spathulata, Hooker, *Compan. Bot. Mag.* i. 25 (not Michaux).

A tree, forty to fifty feet in height, with a straight trunk eighteen or twenty inches in diameter, dividing, five or ten feet from the ground, into stout spreading light gray branches which form a broad compact round head. The bark of the trunk is a quarter of an inch thick, dark brown, deeply furrowed, and broken into long persistent scales. The branchlets are at first light green and slightly pubescent, but soon become glabrous and pale red-brown, and in their second year are stout, more or less zigzag, and ashy gray; they are armed with numerous short stout generally curved or sometimes straight and slender spines, from one third to two thirds of an inch in length, which often terminate lateral branchlets on vigorous shoots. The winter-buds are obtuse, nearly globose, one sixteenth of an inch across, and protected by chestnut-brown suborbicular scales ciliate on the margins and rounded on the back, those of the inner ranks being accrescent with the young shoots, and at maturity foliaceous, obovate, rounded above, nearly entire, and from one third of an inch to nearly an inch in length. The leaves are deciduous, and are lanceolate-oblong to ovate or rhombic, acute or rounded at the apex, gradually contracted into short broad petioles, and crenulate-serrate with minute appressed apiculate teeth; when they unfold they are slightly puberulous on the upper, and glabrous on the under surface, and at maturity are thick, subcoriaceous, dark green, and lustrous, with thin inconspicuous midribs and veins, and are one inch to two inches in length and half an inch to nearly an inch in breadth. The stipules are minute, subulate, one eighth of an inch long, and caducous. On vigorous shoots the leaves are sometimes broadly ovate or almost triangular, wedge-shaped, truncate, or heart-shaped at the base and more or less deeply three-lobed, and are two and a half inches long and two inches broad, with foliaceous broadly ovate to triangular-oblong acute stalked stipules an inch in length, and early deciduous. The flowers, which appear toward the end of April and early in May, when the leaves are nearly fully grown, are one third of an inch across when expanded, and are produced in great profusion on lateral spur-like branchlets in glabrous umbellate corymbs with long slender branches. The bracts and bractlets, which are narrowly lanceolate, acuminate, from one quarter to one half of an inch in length and tinged with red, fall when the flower-buds are half grown, leaving minute gland-like scars. The pedicels are half an inch long, or four or five times the length of the glabrous obconic calyces, which has broadly lanceolate acute entire deciduous lobes. The petals are white, nearly orbicular, and contracted below into short claws, and in drying turn a bright orange-color. The styles vary in number from three to five. The fruit, which matures and falls in the middle of August, is subglobose or occasionally somewhat pyriform, and from one third to one half of an inch in diameter, with a deep cavity and thin flesh, and is bright blue and covered with a glaucous bloom; the nutlets, which are a quarter of an inch long, pointed at the apex, rounded at the base, nearly triangular in section, and slightly two-grooved on the rounded and nearly smooth back, are composed almost entirely of the thick hard walls which inclose minute compressed seeds; these are not more than half a line thick and are covered with a pale brown testa.

Cratægus brachyacantha is distributed from the valley of Bayou Dorcheat in northwestern Louisiana through the western part of that state to the valley of the Sabine River in eastern Texas. It

grows on the borders of streams in rich moist soil, or surrounds with dense groves low wet prairies in western Louisiana, where, a few miles west of Opelousas, it is the most conspicuous and beautiful feature of the arborescent vegetation.

The wood of *Cratægus brachyacantha* is heavy, hard, and very close-grained, with a satiny surface susceptible of receiving a beautiful polish; it contains numerous very obscure medullary rays and is light brown tinged with rose, the thin sapwood, composed of ten or twelve layers of annual growth, being lighter colored. The specific gravity of the absolutely dry wood is 0.6793, a cubic foot weighing 42.33 pounds.

Cratægus brachyacantha was first collected, without flowers or fruit, by the Scotch botanist Thomas Drummond,[1] but its true character was only made known fifty years later, when it was rediscovered by Dr. Charles Mohr[2] near Minden in Louisiana in November, 1880.

Cratægus brachyacantha is the least widely distributed, and one of the largest and most beautiful representatives of the genus in North America. As it grows on the prairies of western Louisiana it is a striking and very attractive object, and its size, its compact well-shaped head, its lustrous foliage, its abundant flowers, and the color of its fruit, which is unlike that of any other Hawthorn, will make the Pomette Bleue, as it is called by the French Acadians of Louisiana, a valuable ornament of gardens and parks where the climate is sufficiently temperate for its full development.[3]

[1] See ii. 25.

[2] Charles Mohr was born in Esslingen, Würtemberg, December 28, 1824, and early imbibed a taste for natural history and the woods from a relative employed in the forest service of Würtemberg, who made the boy his companion. In 1842 he entered the polytechnical school at Stuttgart, where he remained for three years, when, having made the acquaintance of the naturalist Kappler, an employee in the colonial service of Holland, he accompanied him as assistant to Dutch Guiana. Here, however, Mohr's stay was short, owing to repeated attacks of malarial fever; and, after the chemical works at Brunin in Moravia, where he next found employment, were closed in consequence of the political agitations of the year 1848, he sought a home in North America. The spring of 1849 found him crossing the plains to California, where he arrived on foot, after a journey of one hundred and seven days from the Missouri River. In California he made a collection of all the plants he could find in flower on the foothills of the Yuba valley and in the neighborhood of Sacramento. Unfortunately this collection, which doubtless contained a number of undescribed species, as Dr. Mohr was among the earliest botanists to explore central California, was lost during his return journey across the Isthmus of Panama. On reaching the east, Dr. Mohr first settled in Louisville, Kentucky, and, after a journey in Mexico, where he thought of establishing himself, and where he collected Mosses especially, and among them several new species afterwards described by Professor Karl Mueller of Halle, he made his home at Mobile, Alabama. Here for many years he has been a successful manufacturing druggist, and has devoted his spare time to the study of the flora and the natural resources of the state. Being appointed, in 1880, an agent of the Forestry Division of the 10th Census of the United States to investigate the forest resources of the Gulf states, he prosecuted this task during several years with great vigor and intelligence, traveling through all parts of the Gulf region west of the Appalachicola River, and obtaining the first accurate information about the composition and distribution of the southern forests, besides adding much to our knowledge of the range and life-histories of the trees which compose them. Later, as an agent for the American Museum of Natural History in New York, he again explored the southern forests to collect specimens for the Jesup Collection of North American Woods. He made a collection of southern woods under the auspices of the Louisville and Nashville Railroad Company for the New Orleans Exposition, and is now engaged, under the Forestry Division of the Department of Agriculture, in studying some of the most important timber-trees of the south. Dr. Mohr is the author of numerous papers upon the botany and geology of the southern states published in the reports of scientific societies or in more popular form. (See *Pharmaceutische Rundschau*, v. No. 2, 4.)

[3] Seeds of *Cratægus brachyacantha* were distributed by the Arnold Arboretum, in 1883, to the principal botanical establishments of Europe. In eastern Massachusetts the climate has proved too severe for it, and the young plants have all perished.

EXPLANATION OF THE PLATE.

PLATE CLXXVII. CRATÆGUS BRACHYACANTHA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. A fruit with a part of the flesh removed, showing the nutlets, natural size.
5. A nutlet, natural size.
6. A nutlet divided transversely, enlarged.
7. A vigorous shoot with stipules, natural size.
8. A lobed leaf, natural size.

C.E. Faxon del. Picart fr. sc.

CRATÆGUS BRACHYACANTHA, Engelm. et Sarg.

A. Riocreux direx.t Imp. R. Taneur, Paris.

CRATÆGUS CRUS-GALLI.

Cockspur Thorn. Newcastle Thorn.

LEAVES subcoriaceous, obovate-cuneiform to broadly oval or linear-oblong.

Cratægus Crus-galli, Linnæus, *Spec.* 476. — Miller, *Dict.* ed. 8, No. 5. — Medicus, *Bot. Beob.* 1782, 344. — Moench, *Bäume Weiss.* 28. — Walter, *Fl. Car.* 147. — Willdenow, *Berl. Baumz.* 87; *Spec.* ii. pt. ii. 1004. — Michaux, *Fl. Bor.-Am.* i. 288. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 448. — Persoon, *Syn.* ii. 37. — Pursh, *Fl. Am. Sept.* i. 338. — Nuttall, *Gen.* i. 305. — Elliott, *Sk.* i. 548. — Bigelow, *Fl. Boston.* 118. — Watson, *Dendr. Brit.* i. 56, t. 56. — De Candolle, *Prodr.* ii. 626. — Hooker, *Fl. Bor.-Am.* i. 200. — Don, *Gen. Syst.* ii. 598. — Torrey & Gray, *Fl. N. Am.* i. 463. — Dietrich, *Syn.* iii. 158. — Torrey, *Fl. N. Y.* i. 221. — Roemer, *Fam. Nat. Syn.* iii. 117. — Darlington, *Fl. Cestr.* ed. 3, 83. — Chapman, *Fl.* 127. — Curtis, *Rep. Geolog. Surv. N. Car.* 1860, iii. 83. — Regel, *Act. Hort. Petrop.* i. 108. — Wenzig, *Linnæa*, xxxviii. 137. — Kaleniczenko, *Bull. Mosc.* xlviii. pt. ii. 19. — Emerson, *Trees Mass.* ed. 2, ii. 492, t. — Ridgway, *Proc. U. S. Nat. Mus.* 1882, 66. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 76. — Watson & Coulter, *Gray's Man.* ed. 6, 166. — Coulter, *Contrib. U. S. Nat. Herb.* ii. 107 (*Man. Pl. W. Texas*).

Cratægus lucida, Miller, *Dict.* ed. 8, No. 6. — Moench, *Bäume Weiss.* 28. — Du Roi, *Obs. Bot.* 13. — Wangenheim, *Nordam. Holz.* 53, t. 17, f. 42. — Sprengel, *Syst.* ii. 506. — De Candolle, *Prodr.* ii. 629. — Don, *Gen. Syst.* ii. 599.

Mespilus Crus-galli, Marshall, *Arbust. Am.* 88. — Castiglioni, *Viag. negli Stati Uniti*, ii. 294. — Poiret, *Lam. Dict.* iv. 441. — Desfontaines, *Hist. Arb.* ii. 157. — *Nouveau Duhamel*, iv. 149. — Willdenow, *Enum.* 522; *Berl. Baumz.* ed. 2, 244. — Hayne, *Dendr. Fl.* 80. — Koch, *Dendr.* i. 142.

Mespilus lucida, Ehrhart, *Beitr.* iv. 17. — Moench, *Meth.* 685. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 448. — Spach, *Hist. Vég.* ii. 57.

Cratægus laurifolia, Medicus, *Gesch. Bot.* 84.

Mespilus cuneifolia, Moench, *Meth.* 684.

Cratægus Crus-galli, var. **splendens**, Aiton, *Hort. Kew.* ed. 2, iii. 202.

Mespilus Watsoniana, Spach, *Hist. Vég.* ii. 57.

Cratægus Watsoniana, Roemer, *Fam. Nat. Syn.* iii. 117.

Cratægus Carrierei, Carrière, *Rev. Hort.* 1883, 108, t.

Cratægus Lavallei, Hort. Paris.

A tree, twenty to thirty feet in height, with a trunk four to six feet tall and sometimes a foot in diameter, covered, like the stout rigid spreading branches which form a broad flat or round head, with light red-brown or ashy gray scaly bark, and usually armed with long stout often branched spines. The branchlets are glabrous, and at first green but soon become light brown or gray tinged with brown, or sometimes, in the southern states, bright red and lustrous; they are stout, usually more or less zigzag, light brown to ashy gray in their second year, and armed with stout straight or slightly curved sharp-pointed chestnut-brown or ashy gray spines from one to four inches in length, which continue to enlarge for many years and eventually often become many branched and six or eight inches long. The winter-buds are obtuse, an eighth of an inch long, and covered by chestnut-brown lustrous apiculate scales rounded on the back and scarious on the margins, those of the inner ranks being at maturity lanceolate, acute, finely glandular-serrate, from one half of an inch to an inch in length, sometimes bright red and caducous. The leaves are obovate, cuneiform to broadly ovate or linear-oblong, acute or rounded at the apex, gradually contracted below into short broad petioles, sharply serrate except towards the base with minute appressed usually glandular-tipped teeth, and rarely slightly three-lobed; they are glabrous or occasionally puberulous on the lower surface, thick and coriaceous, dark green and lustrous above, and pale below, reticulate-veined, with narrow midribs and primary veins, an inch to five inches long, and from one quarter of an inch to an inch and a half wide. The stipules are linear-acute to ligulate, minutely glandular-serrate, from one quarter to one half of an inch in length, and caducous; or, on vigorous shoots, they are foliaceous, obliquely ovate, stalked, coarsely glandular-serrate, and sometimes half an inch broad. In the autumn before falling the leaves turn bright orange and scarlet. The flowers, which appear after the leaves are fully grown from the middle of April in Texas to the middle of June

in New England, are produced in many-flowered glabrous or sometimes puberulous thin-branched elongated racemose corymbs, the lower branches from the axils of leaves. The bracts and bractlets are linear-spatulate, acute, finely glandular-serrate, half an inch to an inch in length, usually tinged with red, and caducous. The flowers are two thirds of an inch across and are borne on slender pedicels one half of an inch to nearly an inch in length; the calyx is narrow, obconic, and glabrous or pilose on the outer surface, with linear-lanceolate entire or minutely glandular-serrate persistent lobes rather shorter than the white petals; the pistils are two to five and are surrounded at the base by tufts of pale hairs. The fruit is subglobose or rarely pyriform, and one third of an inch across, with a deep cavity surrounded by the remnants of the calyx-lobes and filaments, and is dull red with thin dry mealy flesh. The nutlets are a quarter of an inch long, rounded at both ends, and two or three-grooved on the back, with broad rounded ridges and thick brittle walls. The seed is acute, one sixteenth of an inch in length, and covered with a thin papery light brown testa.[1]

Cratægus Crus-galli is distributed from the valley of the St. Lawrence to the northern shores of Lake Erie,[2] ranging southward in the United States to the valley of the Chipola River in western Florida, and westward to Missouri and to the valley of the Colorado River in Texas. It grows in rich soil, usually along the margins of swamps, on the borders of prairies, or in the neighborhood of streams; it is generally distributed but nowhere very common in the northern and eastern states, and is abundant and attains its largest size in southern Arkansas, Louisiana, and Texas.

The wood of *Cratægus Crus-galli* is heavy, hard, and close-grained, with a satiny surface, and contains many obscure medullary rays. It is brown tinged with red, with thin lighter colored sapwood. The specific gravity of the absolutely dry wood is 0.7194, a cubic foot weighing 44.83 pounds.

[1] The leaves of *Cratægus Crus-galli*, although easily recognized by their texture and lustrous upper surface, vary considerably in form on different individuals and sometimes on the same individual. Botanists have endeavored to establish varieties based on some of these different leaf-forms, although such characters have little value in Cratægus and are not at all constant or to be depended upon. These varieties are: —

Var. *pyracanthifolia*, Aiton, *Hort. Kew.* ii. 170. — De Candolle, *Prodr.* ii. 626. — Torrey & Gray, *Fl. N. Am.* i. 464. — Loudon, *Arb. Brit.* ii. 820, t. 128, f. 580. — Regel, *Act. Hort. Petrop.* i. 109 (in part). — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 76.

Cratægus salicifolia, Medicus, *Bot. Beob.* 1782, 345. — Roemer, *Fam. Nat. Syn.* iii. 117.

Cratægus Crus-galli, var. *salicifolia*, Aiton, *Hort. Kew.* ii. 170. — De Candolle, *Prodr.* ii. 626. — Loudon, *Arb. Brit.* ii. 820, f. 551–553, 578, t. — Regel, *Act. Hort. Petrop.* i. 110. — Wenzig, *Linnæa*, xxxviii. 139.

Mespilus Crus-galli, var. *salicifolia*, Hayne, *Dendr. Fl.* 80. — Willdenow, *Berl. Baumz.* ed. 2, 244.

Mespilus Crus-galli, var. *pyracanthifolia*, Hayne, *Dendr. Fl.* 80.

Mespilus salicifolia, Koch, *Dendr.* i. 144.

Cratægus Coursetiana, Roemer, *Fam. Nat. Syn.* iii. 117.

Var. *ovalifolia*, *Bot. Reg.* t. 1860. — Torrey & Gray, *Fl. N. Am.* i. 464. — Dietrich, *Syn.* iii. 159. — Loudon, *Arb. Brit.* ii. 821, f. 579, t. — Regel, *Act. Hort. Petrop.* i. 109. — Wenzig, *Linnæa*, xxxviii. 139. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 76.

Mespilus ovalifolia, Hornemann, *Hort. Hafn.* Suppl. 52. — Koch, *Dendr.* i. 143.

Mespilus prunellifolia, Poiret, *Lam. Dict.* Suppl. iv. 72.

Cratægus ovalifolia, De Candolle, *Prodr.* ii. 627. — Don, *Gen. Syst.* ii. 598. — Roemer, *Fam. Nat. Syn.* iii. 117. — Sargent, *Forest Trees N. Am.* 10th *Census U. S.* ix. 76.

Cratægus prunellifolia, De Candolle, *Prodr.* ii. 627. — Don, *Gen. Syst.* ii. 598. — Roemer, *Fam. Nat. Syn.* iii. 117.

Mespilus elliptica, Guimpel, Otto & Hayne, *Abbild. Holz.* 170, t. 144 (not Lamarck). — Spach, *Hist. Vég.* ii. 68.

Var. *linearis*, De Candolle, *Prodr.* ii. 626. — Torrey & Gray, *Fl. N. Am.* i. 464. — Dietrich, *Syn.* iii. 159. — Loudon, *Arb. Brit.* ii. 821, f. 577. — Regel, *Act. Hort. Petrop.* i. 110. — Wenzig, *Linnæa*, xxxviii. 140. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 76.

Mespilus lucida, var. *angustifolia*, Ehrhart, *Beitr.* iv. 18.

Cratægus linearis, Persoon, *Syn.* ii. 37. — Roemer, *Fam. Nat. Syn.* iii. 118.

Mespilus linearis, Desfontaines, *Hist. Arb.* ii. 156. — Poiret, *Lam. Dict.* Suppl. iv. 70. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 448. — Spach, *Hist. Vég.* ii. 57.

This is the most distinct of all the forms of *Cratægus Crus-galli*. It is not known to me in a wild state, and is believed to have originated in Europe, probably in France, where it appears to be more often cultivated than the other forms of the species.

Var. *prunifolia*, Torrey & Gray, *Fl. N. Am.* i. 464. — Dietrich, *Syn.* iii. 159. — Loudon, *Arb. Brit.* ii. 821, f. 576, t. — Regel, *Act. Hort. Petrop.* i. 110. — Wenzig, *Linnæa*, xxxviii. 140. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 77.

Mespilus prunifolia? Marshall, *Arbust. Am.* 90. — Poiret, *Lam. Dict.* iv. 443. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 448. — *Nouveau Duhamel*, iv. 150, t. 40. — Sprengel, *Syst.* ii. 506.

Cratægus prunifolia, Persoon, *Syn.* ii. 37. — De Candolle, *Prodr.* ii. 627. — Don, *Gen. Syst.* ii. 598. — *Bot. Reg.* t. 1868.

Var. *Fontanesiana*, Wenzig, *Linnæa*, xxxviii. 141.

Mespilus Fontanesiana, Spach, *Hist. Vég.* ii. 58, t. 10, f. K.

Mespilus Bosciana, Spach, *Hist. Vég.* ii. 58.

Cratægus badiata, Bosc, *Nouv. Cours d'Agric.* ii. 224, 11, 58.

Cratægus Bosciana, Roemer, *Fam. Nat. Syn.* iii. 118.

[2] Brunet, *Cat. Vég. Lig. Can.* 26. — Macoun, *Cat. Can. Pl.* i. 147.

In some parts of the country the spurs are used as pins to close the mouths of sacks and for similar purposes.

Cratægus Crus-galli was introduced into English gardens toward the end of the seventeenth century,[1] and the first description and portrait of this tree are those of Plukenet, made from cultivated plants and published in 1691 in his *Phytographia*.[2]

In western Louisiana, and eastern Texas and occasionally in the southern Atlantic states, a variety, *Cratægus Crus-galli*, var. *berberifolia*,[3] occurs with obovate leaves rounded at the apex and covered, as are the shoots, the corymbs, and the calyces, by thick pale persistent pubescence, and with orange-colored red-cheeked fruit. In its habit, however, in the appearance of its bark, the form and texture of its leaves, the character of its thorns, or the nature of its wood, this tree is not distinguishable from the ordinary form of the Cockspur Thorn which grows with it.

The specific gravity of the absolutely dry wood of *Cratægus Crus-galli*, var. *berberifolia*, is 0.6126, a cubic foot weighing 38.17 pounds.[4]

It was discovered many years ago near Opelousas[5] in Louisiana, by Professor William M. Carpenter.[6]

Cratægus Crus-galli has been more generally cultivated in the United States and in Europe than any other American Hawthorn, and as a cultivated plant it is particularly beautiful. It flowers later than most trees, and after its large and beautifully lustrous leaves are fully developed. Its habit is always good and often striking; its foliage is less subject to fungal diseases than that of the other American species; and its fruit, which birds do not devour, covers the branches until the spring without losing color. It is the best of the American Hawthorns to plant in hedges,[7] and for more than a century has been used in some parts of the eastern states for this purpose.[8]

[1] Aiton, *Hort. Kew.* ii. 170. — Loudon, *Arb. Brit.* ii. 820, f. 574, 575, t.

[2] *Mespilus aculeata Pyrifolia denticulata splendens, fructu insigni rutilo Virginiensis*, t. 46, f. 1; *Alm. Bot.* 249. — Miller, *Dict.* No. 9.

Mespilus; spinosa, sive Oxyacantha Virginiana. The Cockspur or Virginian Hawthorn, Miller, *Dict.* No. 8.

Mespilus foliis lanceolatis serratis, spinis robustioribus, floribus corymbosis, Miller, *Dict. Icon.* 119, t. 178, f. 2.

[3] Sargent, *Garden and Forest*, ii. 464.

Cratægus berberifolia, Torrey & Gray, *Fl. N. Am.* i. 469. — Dietrich, *Syn.* iii. 159. — Walpers, *Rep.* ii. 59. — Roemer, *Fam. Nat. Syn.* iii. 115. — Regel, *Act. Hort. Petrop.* i. 123. — Engelmann, *Bot. Gazette*, vii. 128. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 82.

Mespilus berberifolia, Wenzig, *Linnæa*, xxxviii. 125.

[4] *Garden and Forest*, iii. 344.

[5] This tree is common four miles west of Opelousas, Louisiana, on land adjoining the plantation of Monsieur Pierre Pompon Petre, in an open grove of Oaks and Hickories, growing on low moist ground with the Hornbeam, the Flowering Dogwood, and the Parsley Haw, close to the border of a prairie surrounded by broad masses of *Cratægus brachyacantha*.

[6] William M. Carpenter (1811–1848) was born in St. Francisville in the parish of West Feliciana, Louisiana. In 1829 he entered the military academy at West Point, but two years later delicate health compelled him to resign, and he left the academy before graduation and began the study of medicine in the Louisiana Medical College, from which he was graduated in 1836, when he was called to the chair of natural history and chemistry in the Louisiana State College at Jackson in his native parish. In the six years during which Professor Carpenter was connected with this institution he devoted himself assiduously to studying the flora of Louisiana, communicating the results of his observations to the authors of the *Flora of North America*. In 1842 he was made professor of materia medica and therapeutics in the Louisiana State College, a position which he held until his death, six years later. *Carpenteria*, a genus with a single species, a lovely white-flowered shrub of the California Sierras, was dedicated to his memory by his friend Torrey.

[7] "The *Virginian Azarole* with a red fruit, or *Linnæus's Cratægus Crus-galli*, is a species of hawthorn, and they plant it in hedges, for want of that hawthorn, which is commonly used for this purpose in *Europe*. Its berries are red, and of the same size, shape, and taste with those of our hawthorn. Yet this tree does not seem to make a good hedge, for its leaves were already fallen, whilst other trees still preserved theirs." (Kalm, *Travels*, English ed. i. 115.)

[8] The name of Newcastle Thorn, sometimes given to this species, had its origin in the fact that it was once largely used as a hedge plant by the farmers of Newcastle County, Delaware.

EXPLANATION OF THE PLATES.

Plate CLXXVIII. Cratægus Crus-galli.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. A fruit with a part of the flesh removed, showing the nutlets, natural size.
5. View of the back of a nutlet, natural size.
6. A nutlet divided transversely, enlarged.
7. Winter-buds, natural size.
8. A leaf from a vigorous shoot with stipules, natural size.
9. A leaf of the linear-lanceolate form, natural size.

Plate CLXXIX. Cratægus Crus-galli, *var.* berberifolia.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. Cross section of a fruit, natural size.
5. A nutlet, natural size.
6. A nutlet divided transversely, enlarged.

C.E. Faxon del.

Picart sc.

CRATÆGUS CRUS-GALLI, L.

A. Riocreux direx.t

Imp. R. Taneur, Paris.

C. E. Faxon del. Guesnier sc

CRATÆGUS CRUS-GALLI, Var. BERBERIFOLIA, Sarg.

A. Riocreux direx.t Imp. R. Taneur, Paris.

CRATÆGUS COCCINEA.

Scarlet Haw. White Thorn.

LEAVES membranaceous, round-ovate, acutely incised.

Cratægus coccinea, Linnæus, *Spec.* 476. — Miller, *Dict.* ed. 8, No. 4. — Du Roi, *Harbk. Baumz.* i. 193. — Moench, *Bäume Weiss.* 28. — Walter, *Fl. Car.* 147. — Willdenow, *Berl. Baumz.* 81; *Spec.* ii. pt. ii. 1000 (excl. syn.). — Michaux, *Fl. Bor.-Am.* i. 288. — Persoon, *Syn.* ii. 36. — Pursh, *Fl. Am. Sept.* i. 337. — Nuttall, *Gen.* i. 305. — Schrank, *Pfl. Lab.* 26. — Elliott, *Sk.* i. 553. — Torrey, *Fl. N. Y.* i. 221. — De Candolle, *Prodr.* ii. 627. — Hooker, *Fl. Bor.-Am.* i. 201; *Bot. Mag.* t. 3432. — Don, *Gen. Syst.* ii. 599. — *Bot. Reg.* t. 1957. — Torrey & Gray, *Fl. N. Am.* i. 465. — Bigelow, *Fl. Boston.* ed. 3, 206. — Dietrich, *Syn.* iii. 160. — Walpers, *Rep.* ii. 58. — Schnizlein, *Icon.* t. 270, f. 18–20, 22. — Darlington, *Fl. Cestr.* ed. 3, 83. — Chapman, *Fl.* 127. — Curtis, *Rep. Geolog. Surv. N. Car.* 1860, iii. 82. — Kaleniczenko, *Bull. Mosc.* xlviii. pt. ii. 9. — Emerson, *Trees Mass.* ed. 2, ii. 493, t. — Ridgway, *Proc. U. S. Nat. Mus.* 1882, 66. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 77. — Watson & Coulter, *Gray's Man.* ed. 6, 165.

Mespilus coccinea, Marshall, *Arbust. Am.* 87. — Castiglioni, *Viag. negli Stati Uniti*, ii. 293. — Moench, *Meth.* 684. — Poiret, *Lam. Dict.* iv. 442. — Desfontaines, *Hist. Arb.* ii. 156. — Willdenow, *Enum.* 523; *Berl. Baumz.* ed. 2, 238. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 451. — Hayne, *Dendr. Fl.* 77. — Wendland, *Regensb. Flora*, 1823, 699. — Sprengel, *Syst.* ii. 507. — Spach, *Hist. Vég.* ii. 64.

Cratægus rotundifolia, Moench, *Bäume Weiss.* 29, t. 1.

Mespilus rotundifolia, Ehrhart, *Beitr.* iii. 20. — Wendland, *Regensb. Flora*, 1823, 700. — Koch, *Dendr.* i. 148.

Mespilus coccinea, var. **viridis**, Castiglioni, *Viag. negli Stati Uniti*, ii. 293.

? **Mespilus maxima**, Du Mont de Courset, *Bot. Cult.* ed. 2, v. 451.

? **Cratægus viridis**, Elliott, *Sk.* i. 551 (not Linnæus). — Darlington, *Fl. Cestr.* ed. 2, 293.

Mespilus odorata, Wendland, *Regensb. Flora*, 1823, 700.

? **Mespilus Wendlandii**, Opiz, *Regensb. Flora*, 1834, 590.

Mespilus flabellata, Spach, *Hist. Vég.* ii. 63. — Koch, *Dendr.* i. 148.

Cratægus coccinea, var. **oligandra**, Torrey & Gray, *Fl. N. Am.* i. 465. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 78.

Cratægus coccinea, var. **viridis**, Torrey & Gray, *Fl. N. Am.* i. 465. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 78.

Halmia flabellata, Roemer, *Fam. Nat. Syn.* iii. 136.

Anthomeles rotundifolia, Roemer, *Fam. Nat. Syn.* iii. 140.

Phænopyrum coccineum, Roemer, *Fam. Nat. Syn.* iii. 156.

Phænopyrum Wendlandii, Roemer, *Fam. Nat. Syn.* iii. 156.

Cratægus glandulosa, var. **rotundifolia**, Regel, *Act. Hort. Petrop.* i. 120.

A bushy intricately branched tree, rarely twenty feet in height, with a short trunk sometimes a foot in diameter, and stout spreading branches which form a narrow head; or more often a tall or low shrub. The bark of the trunk is light brown or ashy gray and is slightly fissured, the surface being broken into small persistent plate-like scales. The branchlets, which are at first light green and glabrous or pubescent, in their first winter are usually zigzag, bright red and lustrous or sometimes light brown or gray, and marked by many small pale lenticels, and in their second year become light brown or ashy gray, their bark ultimately separating, like that of the trunk, into persistent scales; they are armed with slender straight or slightly curved chestnut-brown or sometimes gray persistent spines an inch to two inches in length. The winter-buds are nearly globular, one sixteenth of an inch across, and covered with bright chestnut-brown scales, scarious on the margins and rounded on the back; at maturity the scales of the inner rows are from half an inch to an inch in length and are lanceolate, ligulate, or broadly obovate, glandular-serrate, and usually more or less tinged with red. The leaves are round-ovate, acute, wedge-shaped, rounded, truncate, or, on vigorous shoots, often subcordate at the base, acutely incised, or slightly five to nine-lobed, and sharply and irregularly serrate except at the base with acute glandular teeth; they are very thin and membranaceous, at first glabrous or puberulous on the upper, and pubescent on the lower surface, and glabrous at maturity or sometimes puberulous below, and are borne

on slender glabrous or pubescent petioles often an inch to an inch and a quarter long, and vary from an inch to four inches in length and from an inch to two and a half inches in breadth. The stipules are glandular-serrate, caducous, linear, acute, or, on vigorous shoots, foliaceous, broadly ovate, and stalked. The flowers, which appear when the leaves are nearly fully grown, are produced in few-flowered elongated glabrous or pubescent corymbs with lanceolate or narrowly oblong acute glandular-serrate caducous bracts and bractlets; they are borne on slender pedicels, and vary from half an inch to nearly an inch in diameter. The calyx is obconic, and glabrous or puberulous, with long lanceolate denticulate or rarely entire and usually glandular lobes much shorter than the obovate white petals, which are erose or occasionally denticulate towards the base. There are two to five pistils surrounded at the base by tufts of pale hairs. The fruit, which ripens in September and October and generally hangs on the branches until after the leaves have fallen, is subglobose or slightly elongated or pyriform, bright scarlet, and one third to one half of an inch in diameter, with a shallow cavity surrounded by the persistent calyx-lobes and remnants of the filaments, and thin dry flesh; the nutlets are acute at both ends, with two deep grooves and a prominent ridge on the back, and thick hard walls. The seed is acute, and is covered by a pale brown coat.

Cratægus coccinea is distributed from the western shores of Newfoundland through the maritime provinces of Canada, Quebec, and Ontario, and extends westward through Winnipeg nearly to the eastern base of the Rocky Mountains.[1] In the United States it ranges southward to northern Florida and eastern Texas and westward to Nebraska and Kansas. It grows in dense thickets, in open upland woods, or rocky pastures, or in lower ground near the borders of streams and prairies, and is common in all the northern states, on the Alleghany Mountains, and in the valley of the Ohio River, but comparatively rare in the south.

The wood of *Cratægus coccinea* is heavy, hard, and close-grained, with thin obscure medullary rays; it is brown tinged with red, with thin lighter colored sapwood. The specific gravity of the absolutely dry wood is 0.8618, a cubic foot weighing 53.71 pounds.

A distinct form of the Scarlet Thorn, *Cratægus coccinea*, var. *macracantha*,[2] may be distinguished by the longer bright chestnut-brown thorns, two to five inches long, which cover its straggling branches, and by the broadly obovate leaves; these are acute at the apex, wedge-shaped, and contracted below into broad stout petioles, sharply and often doubly serrate with acute glandular-tipped teeth except at the base, sometimes three-lobed, coriaceous, dark green and glabrous on the upper, and paler on the lower surface, with a few pale hairs along the prominent midribs and primary veins, three or four inches long, and two to two and a half inches broad. The flowers are smaller than those of the more common *Cratægus coccinea*, with narrow pectinately glandular calyx-lobes, and are produced in broader looser pilose or pubescent corymbs. The fruit is oblong, or subglobose, smaller and less fleshy, with larger nutlets.

[1] Meyer, *Pl. Lab.* 82. — Macoun, *Cat. Can. Pl.* i. 147.

[2] Dudley, *Bull. Cornell Univ.* ii. 33 (*Cayuga Flora*). — Sargent, *Garden and Forest*, ii. 412. — Watson & Coulter, *Gray's Man.* ed. 6, 165.

? Cratægus glandulosa, Moench, *Bäume Weiss.* 31.

? Pyrus glandulosa, Moench, *Meth.* 680.

Cratægus glandulosa, Willdenow, *Berl. Baumz.* 84 (not Aiton); *Spec.* ii. 1002 (excl. syn.). — Pursh, *Fl. Am. Sept.* i. 337 (in part). — De Candolle, *Prodr.* ii. 627. — Loddiges, *Bot. Cab.* t. 1012. — Hooker, *Fl. Bor.-Am.* i. 201. — Don, *Gen. Syst.* ii. 599. — Loudon, *Arb. Brit.* ii. 817, f. 550, 567, 568, t. — Regel, *Act. Hort. Petrop.* i. 120.

Mespilus sanguinea, Du Mont de Courset, *Bot. Cult.* ed. 2, v. 452 (excl. syn.).

Mespilus glandulosa, Willdenow, *Enum.* 523. — Sprengel, *Syst.* ii. 507. — Watson, *Dendr. Brit.* i. 58, t. 58. — Schmidt, *Oestr. Baumz.* iv. 33, t. 213. — Spach, *Hist. Vég.* ii. 62. — Koch, *Dendr.* i. 145.

Cratægus macracantha, Loddiges; Loudon, *Arb. Brit.* ii. 819, f. 572, 573, t.

Cratægus glandulosa, var. *macracantha*, Lindley, *Bot. Reg.* t. 1912.

Cratægus sanguinea, Torrey & Gray, *Fl. N. Am.* i. 464 (excl. var. β.; not Pallas).

Cratægus coccinea, var. *viridis*, Torrey, *Pacific R. R. Rep.* iv. 86 (not Torrey & Gray).

Cratægus coccinea, T. S. Brandegee, *Rep. Chief Engineer U. S. A.* Appx. S. 1841 (not Linnæus); *Bull. U. S. Geolog. & Geog. Surv. Terr.* ii. 236 (*Fl. Southwest Colorado*). — Coulter, *Man. Rocky Mt. Bot.* 90.

Cratægus Douglasii, Macoun, *Cat. Can. Pl.* i. 522 (not Lindley).

Cratægus coccinea, var. *macracantha*, is common in eastern Massachusetts, where it grows with *Cratægus coccinea;* it occurs on the Maine coast, in northern New Hampshire and Vermont, and in the province of Quebec, and ranges westward through Winnipeg. It occurs in Missouri and is not rare on the Rocky Mountains of southwestern Colorado and of New Mexico, in eastern Oregon, and on the eastern slopes of the Cascade Mountains in Washington.[1]

A shrubby form of the southern states with small thin glabrous deltoid-ovate leaves, usually wedge-shaped or sometimes cordate at the base, and borne on slender petioles, is distinguished as *Cratægus coccinea*, var. *populifolia*.[2] It produces small flowers in narrow few-flowered corymbs, and small fruit.

Cratægus coccinea was probably introduced into English gardens in the seventeenth century, and the earliest descriptions of it were drawn up from cultivated plants.[3]

In cultivation it is a less desirable plant than the related *Cratægus mollis*, and than several other North American species, and it is now rarely found in gardens.

[1] The synonymy of this variety, which is possibly the *Cratægus glandulosa* of Moench, is much involved. If it is the *Cratægus glandulosa* of this author, and is regarded as a variety of *Cratægus coccinea*, its name would be var. *glandulosa*. But the identity of Moench's plant is so doubtful that it is better to pass over this name and take up the much later one of Loddiges and Loudon, although it is in part the *Cratægus glandulosa* of Willdenow, whose name, however, was published later than the *Cratægus glandulosa* of Aiton, which is the *Cratægus flava* of this author. The figure in Watson's *Dendrologia Britannica* was made from this variety, which is admirably portrayed by Schmidt.

[2] Torrey & Gray, *Fl. N. Am.* i. 465. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 78.

Cratægus populifolia, Elliott, *Sk.* i. 553 (not Walter). — Nuttall, *Gen.* i. 305.

Mespilus populifolia, Poiret, *Lam. Dict.* iv. 447.

Phœnopyrum populifolium, Roemer, *Fam. Nat. Syn.* iii. 153.

Cratægus coccinea, var. *typica*, Regel, *Act. Hort. Petrop.* i. 121.

[3] The confusion in the pre-Linnæan descriptions of the American Hawthorns makes it impossible in some cases to determine which species different authors intended to describe; but it is apparent that some of the descriptions which have usually been thought to refer to *Cratægus coccinea* relate rather to *Cratægus mollis*, which was well figured by Plukenet.

? Mespilus Virginiana grossulariæ foliis, fructu rubro minore, Alm. Bot. 249 (excl. syn. Banister).

Cratægus foliis ovatis repando-angulatis serratis, Linnæus, *Hort. Cliff.* 187; *Hort. Ups.* 126. — Clayton, *Fl. Virgin.* 54. — Royen, *Fl. Leyd. Prodr.* 272.

EXPLANATION OF THE PLATES.

Plate CLXXX. Cratægus coccinea.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. A fruit with part of the flesh removed, showing the nutlets, natural size.
5. View of the side of a nutlet, natural size.
6. A nutlet divided transversely, enlarged.
7. The end of a vigorous leafy shoot with stipules, natural size.
8. A winter branchlet, natural size.

Plate CLXXXI. Cratægus coccinea, *var.* macracantha.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. Cross section of a fruit, enlarged.
5. A nutlet, natural size.
6. A nutlet divided transversely, enlarged.
7. Portion of a young branchlet with stipules, natural size.

C. E. Faxon del.

Himely sc.

CRATÆGUS COCCINEA, L.

A. Riocreux direx.t

Imp. R. Taneur, Paris.

C. E. Faxon del.

CRATÆGUS COCCINEA, Var. MACRACANTHA, Dudley.

Toulet sc.

A. Riocreux direx.t

Imp. Taneur, Paris.

CRATÆGUS MOLLIS.

Scarlet Haw.

LEAVES membranaceous, broadly ovate, usually incisely lobed, pubescent on the lower surface.

Cratægus mollis, Scheele, *Linnæa*, xxi. 569; *Roemer Texas*, Appx. 473.—Walpers, *Ann.* ii. 523.

Mespilus coccinea, Schmidt, *Oestr. Baumz.* iv. 30, t. 210 (not Linnæus).

Mespilus pubescens, Wendland, *Regensb. Flora*, 1823, 700 (not Humboldt & Bonpland).

Mespilus coccinea, *β.* **pubescens**, Tausch, *Regensb. Flora*, 1838, pt. ii. 718.

Cratægus coccinea, var. **mollis**, Torrey & Gray, *Fl. N. Am.* i. 465. — Gray, *Jour. Bost. Soc. Nat. Hist.* vi. 186 (*Pl. Lindheim.* ii.). — Regel, *Act. Hort. Petrop.* i. 121. — Wenzig, *Linnæa*, xxxviii. 132. —Watson & Coulter, *Gray's Man.* ed. 6, 165. — Coulter, *Contrib. U. S. Nat. Herb.* ii. 107 (*Man. Pl. W. Texas*).

Cratægus tomentosa, Emerson, *Trees Mass.* 435; ed. 2, ii. 494, t. (not Linnæus). — Provancher, *Flore Canadienne*, 212.

Phænopyrum subvillosum, Roemer, *Fam. Nat. Syn.* iii. 154.

Cratægus subvillosa, Torrey, *Pacific R. R. Rep.* iv. 86. — Ridgway, *Proc. U. S. Nat. Mus.* 1882, 66. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 78. — Havard, *Proc. U. S. Nat. Mus.* viii. 512.

Cratægus Texana, Buckley, *Proc. Phil. Acad.* 1861, 454.

Cratægus tomentosa, var. **mollis**, Gray, *Man.* ed. 5, 160.

Mespilus tiliæfolia, Koch, *Dendr.* i. 151.

A tree, twenty to thirty feet in height, with a straight trunk twelve to eighteen inches in diameter, and spreading often contorted branches which form a compact round head. The bark of the trunk is one third of an inch thick, slightly furrowed, and ashy gray to reddish brown, the surface being broken into small persistent plate-like scales. The branchlets are coated when young with thick pale tomentum, and in their first winter are light orange-brown, lustrous, and marked by pale lenticels, becoming darker in their second year and eventually ashy gray; they are stout, zigzag, and armed with thick and straight spines which are chestnut-brown and lustrous or finally ashy gray and two or three inches in length. The winter-buds are obtuse, one eighth of an inch long, and protected by orbicular chestnut-brown lustrous scales ciliate on the margins and rounded on the back; the scales of the inner rows at maturity are obovate, rounded or truncate at the apex, glandular-serrate, and from half an inch to an inch in length. The leaves are broadly ovate, acute at the apex, cuneate, truncate, or cordate at the base, sharply serrate with slender spreading glandular-tipped teeth, and often incisely many-lobed; when they unfold they are coated on the lower surface with pale tomentum, and are more or less pubescent on the upper surface; and at maturity they are thin and membranaceous, pubescent or tomentose below, glabrous or slightly scabrous above, light green, with broad prominent midribs and primary veins deeply grooved on the upper side, three to five inches long, and three to four inches broad, and borne on stout pubescent petioles an inch to two inches in length. The stipules are glandular-serrate, deciduous, foliaceous, acute, or lunate, and sometimes an inch broad on vigorous shoots. The flowers, which are from an inch to an inch and a quarter across when expanded, are produced in broad pubescent or tomentose stout-branched corymbs, with large spatulate glandular-serrate deciduous or occasionally persistent bracts and bractlets, and appear several days earlier than those of *Cratægus coccinea*, when the leaves are half grown, which in Texas is in March and in New England from the middle to the end of May. The calyx is obconic, coated with tomentum or pubescence, and lined with a bright red or green disk; the lobes are acute, glandular-serrate, and persistent. The ovaries are pubescent or puberulous, and are surrounded at the base with tufts of pale hairs. The fruit, which ripens and falls in September or early in October, is subglobose or pyriform, with a shallow cavity surrounded by the remnants of the

calyx-lobes and filaments; it is often pubescent while young, and at maturity is an inch to an inch and a quarter in diameter, bright orange-scarlet, and covered with a glaucous bloom; the flesh is thin and mealy but sweet and edible; the nutlets are pointed at both ends, lunate, rounded on the back, with a single broad deep or sometimes shallow groove down the middle, thin brittle walls, and a large seed covered with a pale brown coat.

Cratægus mollis is distributed from the shores of Massachusetts Bay to northern New England and the province of Quebec,[1] and ranges westward through central Michigan to Missouri and middle Tennessee, and through Arkansas to the valley of the San Antonio River in Texas, reappearing on the Sierra Madre near Saltillo in Mexico. It grows on the margins of swamps, along the banks of streams, and on prairies in rich soil; in New England it is more tree-like in habit and attains a larger size than the other native Hawthorns, and reaches its best development in Texas and southern Arkansas, where it abounds.

The wood of *Cratægus mollis* is heavy, hard, and close-grained, although not strong; it is light brown or red, with thick sapwood composed of twenty-five or thirty layers of annual growth, and contains numerous very obscure medullary rays. The specific gravity of the absolutely dry wood is 0.7953, a cubic foot weighing 49.56 pounds.

Cratægus mollis, although it was long confounded with *Cratægus coccinea*, was introduced into European gardens and was described and figured before the end of the seventeenth century,[2] and it is no doubt this species which is called the White Thorn in early accounts of New England.[3]

It is the largest and handsomest of the Scarlet Hawthorns of North America, and its rapid growth, tree-like habit, ample foliage, and large and abundant flowers, as well as its brilliant fruit which, however, has the disadvantage of falling as soon as it ripens, commend it to the attention of planters.

[1] Brunet, *Cat. Vég. Lig. Can.* 25. — Macoun, *Cat. Can. Pl.* i. 147.

[2] *Mespilus Apii folio Virginiana spinis horrida, fructu amplo coccineo*, Plukenet, *Phyt.* t. 46, f. 4; *Alm. Bot.* 249.

Mespilus spinosa, sive Oxyacantha maxima Virginiana, Hermann, *Cat. Lugd. Bat.* 423. — Boerhaave, *Cat. Lugd. Bat.* ii. 257. — *Cat. Pl. Lond.* p. 49.

Mespilus aculeata pyrifolia denticulata splendens fructu insigni rutilo Virginiensis, *Cat. Pl. Lond.* t. 13, f. 2 (not Plukenet).

Mespilus Canadensis, Sorbi torminalis facie, Tournefort, *Inst.* 642. — Duhamel, *Traité des Arbres*, ii. 16.

[3] "Also, mulberries, plums, raspberries, corrance, chestnuts, filberds, walnuts, smalnuts, hurtleberies, and hawes of whitethorne neere as good as our cherries in England, they grow in plentie here." (Higginson, *New England's Plantation* [*Coll. Mass. Hist. Soc.* i. 119].)

"The whitethorne affords haws as bigge as an English Cherrie, which is esteemed above a Cherrie for his goodnesse and pleasantnesse to the taste." (Wood, *New England's Prospect*, pt. i. chap. 5, 20.)

EXPLANATION OF THE PLATE.

PLATE CLXXXII. CRATÆGUS MOLLIS.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. A subglobose fruit, natural size.
5. A fruit, part of the flesh removed, showing nutlets, enlarged.
6. A nutlet, natural size.
7. A nutlet divided transversely, enlarged.
8. A stipule of a young branchlet, natural size.
9. A winter branchlet, natural size.

C.E. Faxon del. *Picart sc.*

CRATÆGUS MOLLIS., Scheele.

A. Riocreux direx.t *Imp. R. Taneur, Paris.*

CRATÆGUS TOMENTOSA.

Haw.

LEAVES ovate to ovate-oblong, contracted into margined petioles, densely coated with pubescence on the lower surface.

Cratægus tomentosa, Linnæus, *Spec.* 476 (excl. syn. Clayton). — Miller, *Dict.* ed. 8, No. 9. — Du Roi, *Harbk. Baumz.* i. 183. — Torrey & Gray, *Fl. N. Am.* i. 465. — Dietrich, *Syn.* iii. 160. — Torrey, *Fl. N. Y.* i. 222. — Chapman, *Fl.* 127. — Wenzig, *Linnæa*, xxxviii. 129. — Ridgway, *Proc. U. S. Nat. Mus.* 1882, 66. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 79; *Garden and Forest*, ii. 423, f. 126. — Watson & Coulter, *Gray's Man.* ed. 6, 166.

Cratægus leucophlœos, Moench, *Bäume Weiss.* 31, t. 2. — Regel, *Act. Hort. Petrop.* i. 106. — Lavallée, *Arb. Segrez.* 77, t. 22.

Mespilus Calpodendron, Ehrhart, *Beitr.* ii. 67. — Burgsdorf, *Anleit.* pt. ii. 147.

Cratægus pyrifolia, Aiton, *Hort. Kew.* ii. 168. — Willdenow, *Berl. Baumz.* 83; *Spec.* ii. pt. ii. 1001. — Persoon, *Syn.* ii. 36. — *Nouveau Duhamel*, iv. 131. — Poiret, *Lam. Dict.* Suppl. i. 192. — Pursh, *Fl. Am. Sept.* i. 337. — Nuttall, *Gen.* i. 305. — Elliott, *Sk.* i. 550. — De Candolle, *Prodr.* ii. 627. — Hooker, *Fl. Bor.-Am.* i. 201. — Don, *Gen. Syst.* ii. 599. — *Bot. Reg.* t. 1877. — Loudon, *Arb. Brit.* ii. 819, f. 571, t. — Kaleniczenko, *Bull. Mosc.* xlviii. pt. ii. 15.

Mespilus tomentosa, Castiglioni, *Viag. negli Stati Uniti*, ii. 293.

Mespilus latifolia, Poiret, *Lam. Dict.* iv. 444. — Desfontaines, *Hist. Arb.* ii. 156. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 450. — *Nouveau Duhamel*, iv. 150. — Spach, *Hist. Vég.* ii. 60.

Cratægus latifolia, Persoon, *Syn.* ii. 37. — De Candolle, *Prodr.* ii. 627. — Don, *Gen. Syst.* ii. 598. — Roemer, *Fam. Nat. Syn.* iii. 119.

Mespilus pyrifolia, Willdenow, *Enum.* 523; *Berl. Baumz.* ed. 2, 240. — Schmidt, *Oestr. Baumz.* iv. 34, t. 216. — Sprengel, *Syst.* ii. 507. — Hayne, *Dendr. Fl.* 78.

Mespilus lobata, Poiret, *Lam. Dict.* Suppl. iv. 71.

Cratægus lobata, De Candolle, *Prodr.* ii. 628.

Halmia tomentosa, Roemer, *Fam. Nat. Syn.* iii. 135.

Halmia tomentosa, β. pyrifolia, Roemer, *Fam. Nat. Syn.* iii. 135.

Halmia tomentosa, δ. leucophlæa, Roemer, *Fam. Nat. Syn.* iii. 135.

Halmia tomentosa, ε. Calpodendron, Roemer, *Fam. Nat. Syn.* iii. 136.

Halmia lobata, Roemer, *Fam. Nat. Syn.* iii. 136.

Cratægus tomentosa, var. pyrifolia, Gray, *Man.* ed. 5, 160.

A tree, fifteen or twenty feet in height, with a straight trunk five or six inches in diameter, separating, a few feet from the ground, into slender branches which often spread nearly at right angles and form a wide flat head; or frequently a shrub with many distinct straggling stems. The bark of the trunk is an eighth of an inch thick, ashy gray to dark brown, fissured, and broken on the surface into small persistent scales. The branchlets are coated at first with thick pale tomentum; as this disappears they become dark orange-color, and in their first winter they are puberulous and marked by many minute dark spots, and at the base by the conspicuous ring-like scars left by the falling of the inner bud-scales; they are ashy gray in their second year, and are slender, often contorted or zigzag, smooth, and usually unarmed, although sometimes furnished with slender ashy gray or very rarely chestnut-brown straight slender sharp spines an inch to an inch and a half in length. The winter-buds are nearly globular, and are protected by orbicular chestnut-brown scales ciliate on the margins and apiculate at the apex. The leaves are ovate to ovate-oblong, acute or rarely rounded at the apex, gradually contracted below into broad winged petioles, generally incisely lobed, and sharply and usually doubly serrate except at the base with broad spreading teeth sometimes tipped towards the lower part of the blade with minute glands which occasionally appear also on the petioles; they are thin but firm in texture, gray-green, coated with pale persistent pubescence on the lower surface, puberulous and ultimately glabrous on the upper surface, conspicuously reticulate-veined, with broad midribs and primary veins, from two to five inches in length and from an inch to three inches in breadth. The stipules are linear, acute, minutely

glandular-serrate, and from one quarter to one half of an inch long. The leaves turn brilliant orange and scarlet in the autumn before falling. The flowers are produced in broad leafy pubescent slender-branched cymes with lanceolate acute minutely glandular-serrate bracts and bractlets. They are half an inch across and have a strong disagreeable odor, and in Texas open as early as the middle of March and at the north in the middle of June, or some two weeks later than those of the forms of *Cratægus coccinea* with which this species has often been confounded. The calyx is coated with pale tomentum, and is obconic with long lanceolate acute taper-pointed persistent lobes, which are deeply or pinnately serrate and usually glandular, reflexed after anthesis, and equal or exceed in length the obovate erose white petals, and glabrous pistils, which are two to five in number. The fruit is pear-shaped or rarely subglobose and half an inch broad, with a shallow cavity surrounded by the remnants of the calyx-lobes, thin dry flesh, and short obtuse thick-walled nutlets rounded and sometimes obscurely two-grooved on the back; it is erect and dull red, and remains on the branches with little loss of color until the leaf-buds unfold in the following spring.

Cratægus tomentosa is distributed from the valley of the Hudson River near Troy [1] to eastern Pennsylvania,[2] and ranges westward through central New York to central Michigan, and Missouri; it occurs on the Alleghany Mountains from northern Georgia to central Tennessee, and extends through Arkansas to eastern Texas.[3] It usually grows in low rich soil in the neighborhood of streams and on the margins of the forest, and, except in western New York and southeastern Missouri, is not known to be very common.

The wood of *Cratægus tomentosa* is heavy, hard, and close-grained, and contains numerous thin medullary rays; it is bright reddish brown, with thick lighter colored sapwood. The specific gravity of the absolutely dry wood is 0.7585, a cubic foot weighing 47.57 pounds.

Cratægus tomentosa is often found in English gardens, where it was introduced by Lee & Kennedy in 1765,[4] and in those of France and Germany. The brilliant color of its foliage in autumn and the persistence of the fruit on its branches during the winter constitute its chief value as an ornamental plant.

[1] *Cratægus tomentosa* was discovered here by Professor H. G. Jesup in June, 1889.

[2] It was detected by Professor Thomas C. Porter on Chestnut Hill, Easton, Pennsylvania, in May, 1889.

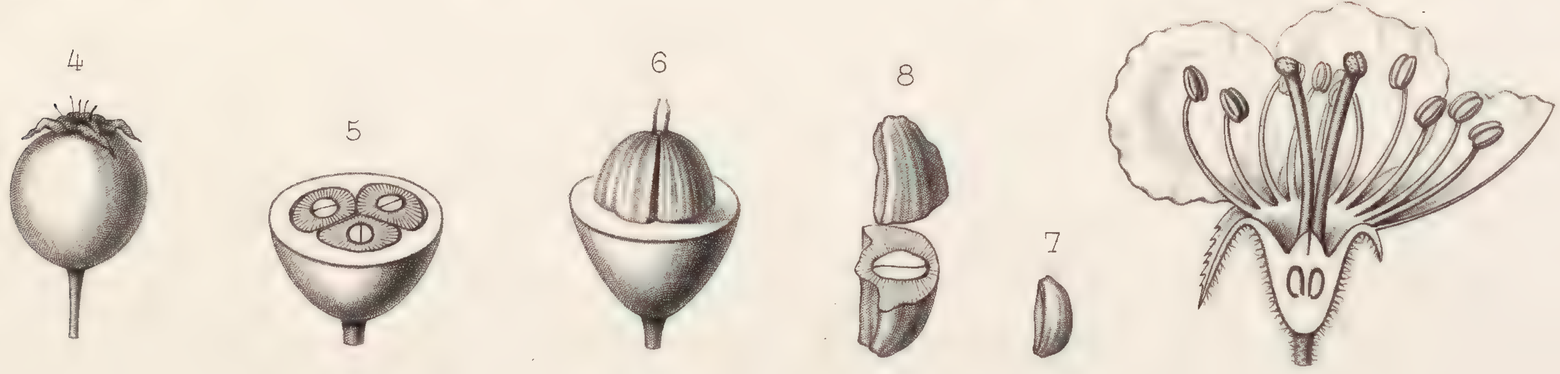
[3] It was found near Dallas by Mr. J. Reverchon in 1880.

[4] Aiton, *Hort. Kew.* ii. 168.—Loudon, *Arb. Brit.* ii. 819, f. 571, t.

EXPLANATION OF THE PLATE.

PLATE CLXXXIII. CRATÆGUS TOMENTOSA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. A subglobose fruit, natural size.
5. Cross section of a fruit, enlarged.
6. A fruit, a part of the flesh removed, showing the nutlets, enlarged.
7. A nutlet, natural size.
8. A nutlet divided transversely, enlarged.
9. Portion of a leafy shoot with stipules, natural size.
10. Winter-buds, natural size.



C.E. Faxon del. Picart sc.

CRATÆGUS TOMENTOSA, L.

A. Riocreux direx.t Imp. R. Taneur, Paris.

CRATÆGUS PUNCTATA.

Haw.

LEAVES wedge-obovate, prominently veined.

Cratægus punctata, Jacquin, *Hort. Vind.* i. 10, t. 28. — Willdenow, *Berl. Baumz.* 86; *Spec.* ii. pt. ii. 1004. — Michaux, *Fl. Bor.-Am.* i. 289. — Persoon, *Syn.* ii. 37. — Pursh, *Fl. Am. Sept.* i. 338. — Elliott, *Sk.* i. 548. — Torrey, *Fl. N. Y.* i. 222. — De Candolle, *Prodr.* ii. 627. — Hooker, *Fl. Bor.-Am.* i. 201 (excl. var.). — Don, *Gen. Syst.* ii. 598. — Torrey & Gray, *Fl. N. Am.* i. 466. — Dietrich, *Syn.* iii. 159. — Emerson, *Trees Mass.* 435. — Darlington, *Fl. Cestr.* ed. 3, 84. — Provancher, *Flore Canadienne*, 211. — Regel, *Act. Hort. Petrop.* i. 106. — Kaleniczenko, *Bull. Mosc.* xlviii. pt. ii. 14. — Watson & Coulter, *Gray's Man.* ed. 6, 166.

Mespilus cornifolia, Muenchhausen, *Hausv.* v. 145. — Poiret, *Lam. Dict.* iv. 444. — Koch, *Dendr.* i. 134.

Mespilus cuneiformis, Marshall, *Arbust. Am.* 88.

Cratægus Crus-galli, Wangenheim, *Nordam. Holz.* 52 (not Linnæus). — Du Roi, *Harbk. Baumz.* i. 195.

Mespilus cuneifolia, Ehrhart, *Beitr.* iii. 21 (not Moench). — Schmidt, *Oestr. Baumz.* iv. 34, t. 215. — Sprengel, *Syst.* ii. 506. — Spach, *Hist. Vég.* ii. 61.

Mespilus punctata, Loiseleur, *Nouveau Duhamel*, iv. 152. — Willdenow, *Enum.* 524; *Berl. Baumz.* ed. 2, 243. — Poiret, *Lam. Dict.* Suppl. iv. 70. — Hayne, *Dendr. Fl.* 79. — Watson, *Dendr. Brit.* i. 57, t. 57. — Spach, *Hist. Vég.* ii. 61. — Wenzig, *Linnæa*, xxxviii. 128.

Mespilus pyrifolia, Desfontaines, *Hist. Arb.* ii. 156 (not Willdenow). — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 452. — Spach, *Hist. Vég.* ii. 60, t. 10, f. C.

Cratægus punctata, var. rubra, Aiton, *Hort. Kew.* ii. 170.

Cratægus punctata, var. aurea, Aiton, *Hort. Kew.* ii. 170.

Cratægus latifolia, De Candolle, *Prodr.* ii. 627.

Cratægus flava, Darlington, *Fl. Cestr.* ed. 2, 292 (not Aiton).

Mespilus Trewiana, Tausch, *Regensb. Flora*, 1838, pt. ii. 716.

Cratægus cuneifolia, Roemer, *Fam. Nat. Syn.* iii. 118.

Cratægus obovatifolia, Roemer, *Fam. Nat. Syn.* iii. 120.

Halmia punctata, Roemer, *Fam. Nat. Syn.* iii. 134.

Halmia cornifolia, Roemer, *Fam. Nat. Syn.* iii. 135.

Phænopyrum Trewianum, Roemer, *Fam. Nat. Syn.* iii. 154.

Cratægus tomentosa, var. punctata, Gray, *Man.* ed. 2, 124. — Chapman, *Fl.* 127. — Brunet, *Cat. Vég. Lig. Can.* 26. — Sargent, *Forest Trees N. Am. 10th Census U. S.* ix. 80. — Macoun, *Cat. Can. Pl.* i. 147.

Cratægus tomentosa, var. plicata, Wood, *Cl. Book*, 330; *Bot. and Fl.* 111.

Cratægus punctata, var. xanthocarpa, Lavallée, *Arb. Segrez.* i. 53, t. 16.

A tree, twenty to thirty feet in height, with a trunk occasionally eight or ten inches in diameter, and stout branches spreading nearly at right angles with the stem and forming a broad round or flat-topped head. The bark of the trunk is from one sixteenth to one eighth of an inch thick, with a dark red-brown surface broken into long persistent plate-like scales. The branchlets are coated at first with pale pubescence; this soon disappears, and in their first winter they are light brown and conspicuously marked at the base by the scars left by the inner scales of the leaf-buds; in their second year they are ashy gray, silvery white, or light brown, and ultimately become light brown, and are slender, rigid, armed with straight sharp light brown spines two to three inches long, or often unarmed. The winter-buds are obtuse, one eighth of an inch across, and covered by pale brown lustrous orbicular apiculate scales. The leaves are wedge-obovate, pointed or rounded at the apex, contracted below into long winged petioles, sharply and often doubly serrate above the middle with minutely apiculate teeth, entire or nearly so below, and sometimes, especially on vigorous shoots, more or less incisely lobed; when they unfold they are covered on the lower surface with thick pale pubescence and are pilose on the upper surface; at maturity they are thick and firm, pale gray-green and glabrous on the upper surface, the broad prominent midribs and principal veins, which are deeply impressed above, being more or less thickly covered with pale hairs on the lower surface, two or three inches long and three quarters of an inch to an inch and a half broad. The stipules are lanceolate, acute, glandular-serrate, and caducous. The leaves turn

bright orange or orange and scarlet in the autumn. The flowers are produced in broad leafy thick-branched corymbs, covered with pale tomentum or pubescence, and furnished with long lanceolate caducous bracts and bractlets; they are borne on stout hairy pedicels, and open from the middle of May at the north to the end of June on the high mountains of North Carolina, and vary from one half to three quarters of an inch in diameter; the calyx is narrowly obconic and more or less tomentose, with a dark red disk and narrow acute nearly entire or minutely glandular-serrate persistent lobes covered on the inner surface with scattered pale hairs, and nearly as long as the white petals. There are from two to five styles surrounded at the base by conspicuous tufts of white hairs. The fruit, which ripens and falls in the autumn, is pyriform or subglobose, dull red or sometimes bright yellow, marked by numerous small white spots, and three quarters of an inch to an inch in length, with a deep cavity surrounded by the remnants of the calyx-lobes and filaments, thin dry flesh, and thick-walled nutlets rounded and slightly or deeply grooved on the back.

Cratægus punctata is distributed from the valley of the Chateaugay River in the province of Quebec, where, in the neighborhood of Montreal, it is not uncommon, to the valley of the Detroit River in Ontario; it is not rare in northern New Hampshire and Vermont, and extends south through western Massachusetts, where it abounds, and along the Appalachian Mountain system to northern Georgia, ascending in North Carolina and Tennessee to an elevation of six thousand feet above the level of the sea; it is very common in northern and western New York, ranges westward along the southern shores of the Great Lakes, and crosses the Mississippi River into eastern and southeastern Missouri. It usually grows in rich moist soil in forest glades, or in rocky upland pastures, where it often spreads into broad thickets.

The wood of *Cratægus punctata* is heavy, hard, and close-grained, with numerous thin medullary rays, and is bright red-brown, with thick pale sapwood. The specific gravity of the absolutely dry wood is 0.7681, a cubic foot weighing 47.87 pounds.

Cratægus punctata is said to have been introduced into English gardens in 1746 by the Duke of Argyll,[1] and the first description of it, published in 1770, was drawn up from plants cultivated in the Botanic Garden at Vienna.

In cultivation *Cratægus punctata* is a hardy tree of good habit, especially beautiful in the autumn, when its spreading branches are covered with its abundant and showy fruit.

[1] Aiton, *Hort. Kew.* ii. 169. — Loudon, *Arb. Brit.* ii. 818, f. 569, 570, t.

EXPLANATION OF THE PLATE.

PLATE CLXXXIV. CRATÆGUS PUNCTATA.

1. A flowering branch, natural size.
2. A flower, the petals removed, enlarged.
3. A fruiting branch, natural size.
4. Cross section of a fruit, natural size.
5. A nutlet, natural size.
6. A nutlet divided transversely, natural size.
7. The end of a leafy branch showing the stipules, natural size.
8. A subglobose yellow fruit, natural size.
9. A winter branchlet, natural size.

C.E.Faxon del.

Toulet sc.

CRATÆGUS PUNCTATA, Jacq.

A.Riocreux direx.t

Imp. R.Taneur, Paris.

CRATÆGUS SPATHULATA.

Small Fruited Haw.

LEAVES submembranaceous, spatulate or oblanceolate, crenately toothed or lobed above the middle.

Cratægus spathulata, Michaux, *Fl. Bor.-Am.* i. 288. — Persoon, *Syn.* ii. 37. — Elliott, *Sk.* i. 552. — Loddiges, *Bot. Cab.* t. 1261. — Don, *Gen. Syst.* ii. 599. — Gray, *Bot. Reg.* under t. 1957. — Torrey & Gray, *Fl. N. Am.* i. 467. — Dietrich, *Syn.* iii. 160. — Chapman, *Fl.* 126. — Regel, *Act. Hort. Petrop.* i. 112. — Kaleniczenko, *Bull. Mosc.* xlviii. pt. ii. 31. — Ridgway, *Am. Nat.* vi. 728. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 81. — Watson & Coulter, *Gray's Man.* ed. 6, 165. — Coulter, *Contrib. U. S. Nat. Herb.* ii. 107 (*Man. Pl. W. Texas*).

Mespilus spathulata, Poiret, *Lam. Dict.* Suppl. iv. 68. — Desfontaines, *Hist. Arb.* ii. 157. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 455. — Sprengel, *Syst.* ii. 507. — Spach, *Hist. Vég.* ii. 66. — Koch, *Dendr.* i. 137.

Cratægus microcarpa, Lindley, *Bot. Reg.* t. 1846.

Phænopyrum spathulatum, Roemer, *Fam. Nat. Syn.* iii. 155.

Cotoneaster spathulata, Wenzig, *Linnæa*, xxxviii. 201.

A tree, eighteen to twenty-five feet in height, with a straight trunk occasionally eight or ten inches in diameter, and slender upright branches; or more often a shrub with numerous spreading stems. The bark of the trunk is generally smooth, with minute red-brown appressed scales, and is rarely more than a sixteenth of an inch thick. The branchlets are slender, zigzag, and glabrous; during their first year they are light reddish brown and marked with minute pale lenticels, and later become darker brown; they are unarmed or armed with straight stout light brown spines an inch to an inch and a half in length. The winter-buds are one sixteenth of an inch long, obtuse, and protected by chestnut-brown ovate apiculate scales keeled on the back. The leaves are spatulate or oblanceolate, crenately serrate at the rounded or acuminate apex, on fertile branchlets fascicled, nearly sessile, three quarters of an inch to an inch long and one quarter of an inch broad, or on young sterile branches or vigorous shoots scattered, often deeply three-lobed above the middle, with rounded crenately serrate lobes deeply and sharply incised, contracted below into long winged petioles, and one to two inches in length, and an inch to an inch and a half in breadth; they are deciduous, subcoriaceous, glabrous, dark green, and lustrous above, paler below, and reticulate-veined, with very obscure midribs and primary veins, except on those of vigorous shoots, which have broad and thick midribs often pilose along their lower surface. The stipules are linear, acute, minute, and caducous, or on vigorous shoots are foliaceous, lunate, sharply serrate, stalked, and often half an inch broad. The flowers, which appear from March to May after the leaves are grown to their full size, are produced on long slender pedicels in glabrous many-flowered narrow cymes with linear-lanceolate deciduous bracts and bractlets; they are half an inch across when expanded, with broadly obconic calyx-tubes and short nearly entire persistent calyx-lobes, minutely glandular-apiculate, and much shorter than the white undulate-margined petals, and than the styles, which are two to five in number. The fruit, which ripens in October, is subglobose, crowned with the remnants of the calyx-lobes and filaments, lustrous, bright scarlet, and one eighth of an inch in diameter, with thin dry flesh, nearly orbicular thin brittle-walled nutlets rounded or slightly grooved on the back, and minute seeds covered with a thin brown coat.

Cratægus spathulata is distributed through the coast region of the southern Atlantic states from southern Virginia to northern Florida, and extends westward through the Gulf states to the valley of the Washita River in Arkansas, where it is abundant in the neighborhood of the Hot Springs, and to the valley of the Colorado River in Texas. It grows in rich soil, usually near the banks of streams or

swamps, or in low moist depressions in the Pine forests, and attains its greatest size on the bottom-lands of western Louisiana and eastern Texas.

The wood of *Cratægus spathulata* is heavy, hard, and close-grained, although not strong; it is light brown or red, with thick lighter colored sapwood, and contains numerous very obscure medullary rays. The specific gravity of the absolutely dry wood is 0.7159, a cubic foot weighing 44.61 pounds.

Cratægus spathulata was discovered late in the last century by the French botanist Michaux in South Carolina; it was introduced into French and English gardens early in the present century, but probably no longer occurs in cultivation.

EXPLANATION OF THE PLATE.

PLATE CLXXXV. CRATÆGUS SPATHULATA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. Cross section of a fruit, enlarged.
5. A nutlet, natural size.
6. A nutlet divided transversely, enlarged.
7. The end of a leafy shoot showing stipules.
8. A winter branchlet, natural size.

C. E. Faxon del.

Picart fr. sc.

CRATÆGUS SPATHULATA, Michx.

A. Riocreux direx.t

Imp. R. Taneur, Paris.

CRATÆGUS CORDATA.

Washington Thorn.

LEAVES broadly ovate to triangular, acute, long-petiolate.

Cratægus cordata, Aiton, *Hort. Kew.* ii. 168. — Willdenow, *Berl. Baumz.* 82; *Spec.* ii. pt. ii. 1000. — Persoon, *Syn.* ii. 36. — Elliott, *Sk.* i. 554. — De Candolle, *Prodr.* ii. 628. — Watson, *Dendr. Brit.* i. 63, t. 63. — *Bot. Reg.* t. 1151. — Hooker, *Fl. Bor.-Am.* i. 201. — Don, *Gen. Syst.* ii. 599. — Torrey & Gray, *Fl. N. Am.* i. 467. — Loudon, *Arb. Brit.* ii. 825, t. — Dietrich, *Syn.* iii. 160. — Chapman, *Fl.* 127. — Curtis, *Rep. Geolog. Surv. N. Car.* 1860, iii. 82. — Regel, *Act. Hort. Petrop.* i. 114. — Kaleniczenko, *Bull. Mosc.* xlviii. pt. ii. 31. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 80. — Watson & Coulter, *Gray's Man.* ed. 6, 165.

Mespilus cordata, Miller, *Dict.* ed. 8, No. 4. — Du Roi, *Harbk. Baumz.* ed. 2, i. 615. — Willdenow, *Enum.* 523; *Berl. Baumz.* ed. 2, 239. — Hayne, *Dendr. Fl.* 77. — Schmidt, *Oestr. Baumz.* iv. 31, t. 211. — Guimpel, Otto & Hayne, *Abbild. Holz.* 167, t. 142. — Sprengel, *Syst.* ii. 507. — Koch, *Dendr.* i. 138.

Mespilus Phænopyrum, Linnæus f. *Syst.* Suppl. ed. 13, 254. — Ehrhart, *Beitr.* i. 182; ii. 67. — Moench, *Meth.* 685. — Poiret, *Lam. Dict.* iv. 446.

Cratægus acerifolia, Moench, *Bäume Weiss.* 31.

Mespilus acerifolia, Burgsdorf, *Anleit.* pt. ii. 147. — Poiret, *Lam. Dict.* iv. 442. — *Nouveau Duhamel,* iv. 151. — Spach, *Hist. Vég.* ii. 65.

Cratægus populifolia, Walter, *Fl. Car.* 147. — Pursh, *Fl. Am. Sept.* i. 337.

Mespilus corallina, Desfontaines, *Tab. École Bot. Mus.* 174. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 451. — Tausch, *Regensb. Flora,* 1838, pt. ii. 717.

Phænopyrum cordatum, Roemer, *Fam. Nat. Syn.* iii. 157.

Phænopyrum acerifolium, Roemer, *Fam. Nat. Syn.* iii. 157.

Phalacros cordatus, Wenzig, *Linnæa,* xxxviii. 164.

A tree, twenty to thirty feet in height, with a straight trunk sometimes a foot in diameter, generally dividing, four or five feet from the ground, into slender and usually upright branches which form a handsome oblong or occasionally a round head; or often much smaller and sometimes only a broad spreading bush. The bark of the trunk is light brown and an eighth of an inch thick, the generally smooth surface being broken into long persistent scales. The branchlets are slender, often zigzag, glabrous, pale orange-brown when they first appear, bright chestnut-brown and lustrous and marked by small lenticels in their first winter, and ultimately dark gray or reddish brown, and are armed with slender sharp spines an inch and a half to two inches in length; these, which sometimes terminate sterile lateral branches also, are bright chestnut-brown at first and finally, like the bark of the branches, gray or red-brown. The winter-buds are one sixteenth of an inch long and are protected by obovate apiculate light brown lustrous scales rounded on the back. The leaves are broadly ovate to triangular, acute at the apex, truncate, slightly wedge-shaped or cordate at the base, incisely three to five-cleft or three-lobed, and sharply serrate except at the base with acute or spreading often glandular-tipped teeth; they are subcoriaceous, dark green and lustrous above and pale below, glabrous except for a few deciduous hairs on the upper surface when they unfold, or rarely pubescent on the lower surface, especially on the conspicuous orange-colored midribs and primary veins; they are one and a half to two inches long and an inch to an inch and a half broad, and are borne on slender terete petioles three quarters of an inch to an inch and a half in length. The stipules are lanceolate, acute, entire, half an inch long, and caducous. The leaves turn very late in the autumn bright scarlet and orange before falling. The flowers, which open in the last days of May after the leaves are fully grown, are produced in few-flowered spreading slender-branched corymbs with lanceolate acute minute bracts and bractlets mostly caducous before the expansion of the flower-buds. The calyx is broadly obconic and glabrous, with short or nearly triangular persistent entire lobes abruptly contracted at the apex into minute points, pubescent on the inner surface, bearded on the margins, and much shorter than the obovate white petals;

there are two to five styles surrounded at the base with conspicuous tufts of pale hairs. The fruit ripens in September and October, and remains on the branches until late in the spring of the following year, although it loses its color early in the winter; it is depressed-globular, with a shallow cavity surrounded by the remnants of the reflexed calyx-lobes and filaments.

Cratægus cordata is distributed from the valley of the upper Potomac River in Virginia,[1] southward in the foothill region of the Appalachian Mountains to northern Georgia and Alabama, and westward through middle Tennessee and Kentucky to the valley of the lower Wabash River in Illinois.[2] It grows near the banks of streams in rich moist soil, and is nowhere very common.

The wood of *Cratægus cordata* is heavy, hard, and close-grained; it contains many obscure medullary rays and is brown tinged with red, with thick lighter colored sapwood. The specific gravity of the absolutely dry wood is 0.7293, a cubic foot weighing 45.45 pounds.

Cratægus cordata was known in Europe before the end of the seventeenth century, and Plukenet published in his *Phytographia*, in 1691,[3] a figure which well represents the foliage, and which was probably made from a cultivated tree.

As an ornamental plant *Cratægus cordata* is one of the most valuable of the genus, and few small trees of the North American forests exceed it in beauty; it is hardy as far north at least as New England, where it flowers in the middle of June and later than any other Hawthorn; it grows rapidly, its habit is excellent, its handsome foliage is seldom injured by fungal diseases, and, late in the autumn after the leaves of many trees have fallen, changes slowly to brilliant shades of orange and scarlet which heighten the effect produced by the bright persistent fruit.

The Washington Thorn was once much used in the middle states for hedges, and is still occasionally planted in American gardens; it is better known, however, in those of Europe, and fine old specimens are not uncommon in England, France, and Germany.

[1] *Cratægus cordata* now grows spontaneously and perhaps naturally, as Professor Porter believes, in Penryn, Lebanon County, Pennsylvania, where it was found in 1891 by Mr. J. K. Small.

[2] Patterson, *Cat. Pl. Ill.* 13.

[3] *Mespilus Virginiana Apii folio, vulgari similis major, grandioribus spinis*, t. 46, f. 3; *Alm. Bot.* 249. — Miller, *Dict.* No. 10. — *Cat. Pl. Lond.* 49, t. 3, f. 1.

Mespilus folio cordato ovatis acuminatis margìnibus acute serratis ramis spinosis, Miller, *Dict. Icon.* 119, t. 179.

The popular name by which *Cratægus cordata* is best known, at least in American gardens, is said to be due to the fact that early in the century it was introduced from the neighborhood of the city of Washington into Chester County, Pennsylvania, where it was afterwards more generally used than any other plant for hedges (Darlington, *Fl. Cestr.* ed. 3, 83).

EXPLANATION OF THE PLATE.

PLATE CLXXXVI. CRATÆGUS CORDATA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. A fruit, a part of the flesh removed, showing nutlets, enlarged.
5. A nutlet, natural size.
6. A nutlet divided transversely, enlarged.
7. A leaf of a vigorous young shoot with stipules, natural size.
8. A winter branchlet, natural size.

C.E.Faxon del.

Picart sc.

CRATÆGUS CORDATA, Ait.

A.Riocreux direx.t

Imp.R.Taneur, Paris.

CRATÆGUS VIRIDIS.

Haw.

LEAVES ovate to ovate-oblong or oblong-obovate.

Cratægus viridis, Linnæus, *Spec.* 476. — Willdenow, *Spec.* ii. pt. ii. 1001. — Persoon, *Syn.* ii. 36. — De Candolle, *Prodr.* ii. 630. — Don, *Gen. Syst.* ii. 601. — Sargent, *Garden and Forest*, ii. 411. — Watson & Coulter, *Gray's Man.* ed. 6, 165.

Cratægus arborescens, Elliott, *Sk.* i. 550. — Torrey & Gray, *Fl. N. Am.* i. 466. — Dietrich, *Syn.* iii. 160. — Walpers, *Rep.* ii. 58. — Nuttall, *Sylva*, ii. 10, t. 45. — Chapman, *Fl.* 127. — Wenzig, *Linnæa*, xxxviii. 203. — Engelmann, *Bull. Torrey Bot. Club*, ix. 4. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 75. — Coulter, *Contrib. U. S. Nat. Herb.* ii. 107 (*Man. Pl. W. Texas*).

Phænopyrum arborescens, Roemer, *Fam. Nat. Syn.* iii. 153.

Cratægus Crus-galli, var. **pyracanthifolia**, Regel, *Act. Hort. Petrop.* i. 109 (in part).

A tree, twenty to thirty-five feet in height, with a straight often fluted trunk eight to twelve feet tall and eighteen to twenty inches in diameter, and slender spreading branches which form a round rather compact head. The bark of the trunk is one eighth of an inch thick and is ashy gray to bright reddish brown, and divided by shallow reticulated fissures into small irregular plate-like scales. The branches are slender, glabrous, in their first winter sometimes ashy gray but usually light red-brown and lustrous and marked with minute lenticels, and later pale brown, ashy gray, or nearly white; they are unarmed or occasionally are furnished with slender sharp pale spines three quarters of an inch to an inch in length. The winter-buds are obtuse, chestnut-brown, one sixteenth of an inch long, and covered by ovate minute apiculate scales slightly scarious on the margins; the scales of the inner ranks are foliaceous, lanceolate to oblanceolate, and are sometimes half an inch long at maturity and bright red towards the apex. The leaves are ovate to ovate-oblong or oblong-obovate, acute or sometimes rounded at the apex, wedge-shaped and gradually contracted at the base into long slender petioles, sharply serrate except at the base with spreading teeth often tipped with minute glands, and sometimes three-lobed towards the summit, especially on vigorous shoots; they are membranaceous to subcoriaceous, dark green and lustrous on the upper, and paler on the lower surface, with tufts of pale hairs in the axils of the conspicuous primary veins, one to three inches long and half an inch to an inch and a half broad, with wide thick midribs, and are borne on petioles which vary from an inch to an inch and a half in length. The stipules are linear, acute, half an inch long, and caducous. The leaves turn brilliant scarlet late in the autumn before falling. The flowers, which appear from the end of March in Texas to the beginning of May in Missouri when the leaves are almost fully grown, are three quarters of an inch across when expanded, and are produced in many-flowered leafy glabrous thin-branched corymbs furnished with narrow spatulate often glandular-serrate deciduous bracts and bractlets; the calyx is obconic and glabrous or covered with long pale hairs, and its lanceolate entire lobes are subulate at the apex, reflexed after anthesis, persistent, and much shorter than the broadly obovate white petals; the styles, which vary from two to five in number, are surrounded at the base by conspicuous tufts of pale hairs. The fruit ripens in the autumn and remains on the branches through the winter without changing color; it is depressed-globular, bright scarlet or occasionally orange, and one eighth of an inch in diameter, with a shallow cavity surrounded by the remnants of the calyx-lobes and filaments, thin dry flesh, and thin-walled nutlets narrowed and rounded at the two ends, rounded and barely grooved or ridged on the back, and minute seeds covered with a thin pale brown coat.[1]

[1] West of the Mississippi River from St. Louis to central Arkansas a form with larger, rather thicker, more lustrous leaves and larger fruit is not uncommon. It grows with the ordinary form, flowers at the same time, and is not to be distinguished from it in habit.

Cratægus viridis is distributed in the southern Atlantic states, where it is rare, from the valley of the Savannah River in South Carolina to that of the Chattahoochee in western Florida, and is common west of the Mississippi River from the neighborhood of St. Louis to the valley of the Colorado River in Texas. It grows along the borders of streams and swamps in low moist soil, and in western Louisiana and eastern Texas, where it attains its greatest size and is most abundant, often forming thickets of great extent, it makes in early spring a conspicuous and beautiful feature of the vegetation of the broad river-bottoms.

The wood of *Cratægus viridis* is heavy, hard, and close-grained, although not strong, and is susceptible of receiving a beautiful polish; it is light brown tinged with red, with thick lighter colored sapwood, and contains numerous very obscure medullary rays. The specific gravity of the absolutely dry wood is 0.6491, a cubic foot weighing 40.45 pounds. *Cratægus viridis* was known[1] by Clayton,[2] who probably sent to Linnæus the specimen upon which the species was established, although the tree is not now known to grow so far north as Virginia, the field of Clayton's botanical observations.

In 1876 *Cratægus viridis* was introduced from Missouri into the Arnold Arboretum, where it is perfectly hardy, and is conspicuous late in the autumn by the splendid color of its foliage, which at this season is unsurpassed in brilliancy by that of any other North American tree.

[1] *Mespilus inermis, foliis oblongis integris acuminatis serratis parvis, utrinque viridibus, cortice albicante, Fl. Virgin.* 163.

[2] See i. 8.

EXPLANATION OF THE PLATE.

Plate CLXXXVII. Cratægus viridis.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. A fruit with part of the flesh removed, showing the nutlets, natural size.
5. A nutlet, natural size.
6. A nutlet divided transversely, enlarged.
7. A spine, natural size.
8. End of a leafy shoot with stipules, natural size.
9. A winter branchlet, natural size.

C.E.Faxon del.

Picart sc.

CRATÆGUS VIRIDIS, L.

A.Riocreux dirext

Imp. R. Taneur, Paris.

CRATÆGUS APIIFOLIA.

Parsley Haw.

LEAVES orbicular to broadly ovate, pinnately 5 to 7-cleft.

Cratægus apiifolia, Michaux, *Fl. Bor.-Am.* i. 287. — Persoon, *Syn.* ii. 38. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 454. — Pursh, *Fl. Am. Sept.* i. 336. — Nuttall, *Gen.* i. 305. — Elliott, *Sk.* i. 552. — De Candolle, *Prodr.* ii. 627. — Don, *Gen. Syst.* ii. 599. — Audubon, *Birds*, t. 192. — Torrey & Gray, *Fl. N. Am.* i. 467. — Dietrich, *Syn.* iii. 160. — Roemer, *Fam. Nat. Syn.* iii. 121. — Chapman, *Fl.* 127. — Kaleniczenko, *Bull. Mosc.* xlviii. pt. ii. 29. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 81. — Watson & Coulter, *Gray's Man.* ed. 6, 165.

Cratægus Oxyacantha ?, Walter, *Fl. Car.* 147 (not Linnæus).

Mespilus apiifolia, Marshall, *Arbust. Am.* 89. — Poiret, *Lam. Dict.* Suppl. iv. 68. — Sprengel, *Syst.* ii. 508. — Spach, *Hist. Vég.* ii. 67. — Wenzig, *Linnæa*, xxxviii. 152.

Cratægus Oxyacantha, var. **Americana**, Castiglioni, *Viag. negli Stati Uniti*, ii. 292.

Cratægus apiifolia minor, Loudon, *Arb. Brit.* ii. 825.

Cratægus Oxyacantha, var. **apiifolia**, Regel, *Act. Hort. Petrop.* i. 119 (in part).

A tree, rarely attaining the height of twenty feet, with a slender often inclining trunk three or four inches in diameter, and branches which spread nearly at right angles and form a wide irregular open head; or more often a low shrub with many more or less contorted stems rising from the ground. The bark of the trunk is from one sixteenth to one eighth of an inch in thickness, smooth, and light gray tinged with red. The branchlets, which when they first appear are covered with long pale hairs, are slender, often zigzag and contorted, and are usually armed with stout straight chestnut-brown spines an inch to an inch and a half in length; in their first winter they are light red or pale orange-brown, marked with minute lenticels, and usually puberulous, but ultimately become light brown or ashy gray. The winter-buds are acute, one sixteenth of an inch long, and covered by lustrous chestnut-brown ovate scales apiculate at the apex and scarious on the margins. The leaves are broadly ovate to orbicular, acute at the apex, truncate, slightly cordate or wedge-shaped at the base, and pinnately five to seven-cleft with shallow acute or deep broad sinuses, and incisely lobed segments serrate towards the apex with spreading glandular-tipped teeth; when they unfold they are pilose on the upper surface with long pale hairs, and usually glabrous below, and at maturity are thin and membranaceous, bright green and rather lustrous above and paler below, glabrous or pilose on the lower surface along the prominent midribs and primary veins, or occasionally covered with pubescence on both surfaces, and are two thirds of an inch to an inch and a half broad, and borne on slender pubescent or ultimately glabrous petioles an inch to an inch and a half in length. The stipules are linear, acute, a quarter of an inch long, and caducous, or on vigorous shoots are foliaceous, lunate, coarsely glandular-serrate, short-stalked, and sometimes half an inch in length. The flowers, which appear late in March or early in April when the leaves are fully grown, are half an inch across and are produced on long slender pedicels in few-flowered villose-pubescent somewhat simple corymbs with minute lanceolate acute colored caducous bracts and bractlets; the calyx-tube is narrowly obconic and glabrous or villose-pubescent, with lanceolate acute usually glandular-serrate lobes, often tinged with red towards the apex, reflexed after anthesis, and deciduous or sometimes persistent. The fruit, which ripens in October and remains on the branches until the beginning of winter, is oblong, from a quarter to a third of an inch in length, and bright scarlet, with a minute cavity surrounded by the remnants of the calyx, thin flesh, and one to three thick-walled rugose nutlets barely grooved on the back.

Cratægus apiifolia is distributed through the coast region of the southern Atlantic states from southern Virginia to central Florida, and ranges westward through the Gulf region to southern Arkan-

sas and the valley of the Trinity River in Texas. It is nowhere very common, and usually grows near the borders of streams and swamps in low rich soil, or in Florida on hummocks in the Pine barrens, where it attains its greatest size.

The wood of *Cratægus apiifolia* is heavy, hard, very close-grained, and susceptible of receiving a beautiful polish; it contains many thin very obscure medullary rays, and is light brown tinged with red or rose, with lighter colored sapwood. The specific gravity of the absolutely dry wood is 0.7453, a cubic foot weighing 46.45 pounds.

The earliest account of *Cratægus apiifolia* appears in the *Flora Caroliniana* of Walter, who mistook it for the European Hawthorn. It appears to have been introduced into English gardens [1] early in the present century, but, although the form of its delicate leaves and the abundance of its flowers make it one of the most attractive of the American Hawthorns, it is still an extremely rare plant in cultivation.

[1] Loudon, *Arb. Brit.* ii. 824.

EXPLANATION OF THE PLATE.

PLATE CLXXXVIII. CRATÆGUS APIIFOLIA.

1. A flowering branch, natural size.
2. A flower-bud, enlarged.
3. Vertical section of a flower, enlarged.
4. A fruiting branch, natural size.
5. A fruit with part of the flesh removed, showing the nutlets, enlarged.
6. A nutlet, natural size.
7. A nutlet divided transversely, enlarged.
8. A leaf from a vigorous shoot with stipules, natural size.
9. A winter branchlet, natural size.

C.E. Faxon del.

Picart fr. sc.

CRATÆGUS APIIFOLIA, Michx.

A. Riocreux direx.t

Imp. R. Taneur, Paris.

CRATÆGUS FLAVA.

Summer Haw. Yellow Haw.

LEAVES rhombic-obovate.

Cratægus flava, Aiton, *Hort. Kew.* ii. 169. — Willdenow, *Spec.* ii. pt. ii. 1002. — Persoon, *Syn.* ii. 37. — Pursh, *Fl. Am. Sept.* i. 338. — Nuttall, *Gen.* i. 305. — De Candolle, *Prodr.* ii. 628. — Watson, *Dendr. Brit.* i. 59, t. 59. — Don, *Gen. Syst.* ii. 600. — *Bot. Reg.* t. 1939. — Torrey & Gray, *Fl. N. Am.* i. 468. — Dietrich, *Syn.* iii. 160. — Chapman, *Fl.* 128. — Curtis, *Rep. Geolog. Surv. N. Car.* 1860, iii. 83. — Regel, *Act. Hort. Petrop.* i. 123. — Kaleniczenko, *Bull. Mosc.* xlviii. pt. ii. 27. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 82. — Watson & Coulter, *Gray's Man.* ed. 6, 166.

Cratægus glandulosa, Aiton, *Hort. Kew.* ii. 168 (not Willdenow). — Persoon, *Syn.* ii. 37. — Poiret, *Lam. Dict.* Suppl. iv. 69 (excl. syn. Moench).

Mespilus Caroliniana, Poiret, *Lam. Dict.* iv. 442. — Desfontaines, *Hist. Arb.* ii. 156. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 449. — Schmidt, *Oestr. Baumz.* iv. 32, t. 212. — Sprengel, *Syst.* ii. 507.

Cratægus Caroliniana, Persoon, *Syn.* ii. 36. — Elliott, *Sk.* i. 554.

Mespilus flava, Willdenow, *Enum.* 523. — Poiret, *Lam. Dict.* Suppl. iv. 70. — Spach, *Hist. Vég.* ii. 59, t. 10, f. H.

Cratægus turbinata, Pursh, *Fl. Am. Sept.* ii. Suppl. 735. — Poiret, *Lam. Dict.* Suppl. v. 543. — Elliott, *Sk.* i. 549. — De Candolle, *Prodr.* ii. 627. — Don, *Gen. Syst.* ii. 599.

Mespilus turbinata, Sprengel, *Syst.* ii. 506. — Spach, *Hist. Vég.* ii. 66.

Cratægus lobata, De Candolle, *Prodr.* ii. 628. — Don, *Gen. Syst.* ii. 599. — Loudon, *Arb. Brit.* ii. 824, f. 554, 586.

Cratægus flava, var. lobata, Lindley, *Bot. Reg.* t. 1932.

Anthomeles flava, Roemer, *Fam. Nat. Syn.* iii. 142.

Anthomeles glandulosa, Roemer, *Fam. Nat. Syn.* iii. 141.

Anthomeles turbinata, Roemer, *Fam. Nat. Syn.* iii. 142.

Phænopyrum Carolinianum, Roemer, *Fam. Nat. Syn.* iii. 152.

Mespilus flexispina, Koch, *Dendr.* i. 139 (not Moench). — Wenzig, *Linnæa*, xxxviii. 127.

A tree, twenty to twenty-five feet in height, with a straight stout trunk ten or twelve inches in diameter, dividing, five or six feet from the ground, into short spreading often pendulous branches which form a handsome compact round head; or often a wide much-branched shrub only a few feet high. The bark of the trunk varies from half an inch to an inch in thickness and is dark brown tinged with red or nearly black and often deeply furrowed, the surface being broken into small square persistent scales. The branchlets are at first villose-pubescent with long pale hairs, and often puberulous in their first winter but ultimately glabrous; they are slender, very zigzag, unarmed, or armed with straight stout spines an inch to an inch and a half in length, and are red-brown, dark gray-brown, or nearly black. The winter-buds are globose, one sixteenth of an inch in diameter, and covered with bright chestnut-brown orbicular scales slightly scarious on the margins; the scales of the inner ranks at maturity are spatulate, rounded at the apex, glandular-serrate, and often half an inch in length. The leaves are rhombic-ovate to obovate-cuneiform, three to five-ribbed, with obscure reticulated veinlets, rounded and sometimes abruptly contracted into short points, gradually narrowed below into broad winged glandular petioles, glandular-serrate with large dark glands, often incised and three to five-lobed on vigorous shoots; when they unfold they are puberulous above and pubescent below, especially along the principal veins, and at maturity are subcoriaceous, yellow-green and lustrous on the upper, and pale and sometimes pubescent on the lower surface, an inch to an inch and a half long, two thirds of an inch to an inch and a quarter broad, and borne on glabrous or pubescent petioles which vary from half an inch to an inch and a half in length. The stipules are glandular-serrate, linear, acute, pubescent, and a quarter of an inch long, or on vigorous shoots are foliaceous, stalked, obovate or lunate, variously and irregularly lobed and incised, and sometimes nearly an inch in length. The flowers, which appear in March and April when the leaves are almost fully grown, are half an inch across when expanded and are produced in simple one to four-flowered thick-branched corymbs; these, like the obovate glandular-serrate caducous bracts and

bractlets, the thick pedicels, and the narrowly obconic calyx-tubes, are coated with thick pale tomentum or are pubescent or puberulous; the calyx-lobes are lanceolate, acute, conspicuously glandular-serrate, or rarely entire and eglandular, pubescent on the outer, and usually glabrous on the inner surface, reflexed after anthesis, persistent, and rather shorter than the white petals which are often erose or crenate on the margins; the disk is dark red and glandular, and around the base of the styles, which are usually four or five in number, are tufts of pale hairs. The fruit is produced sparingly, and ripens and falls in the autumn; it is pyriform or subglobose, half an inch long, and usually greenish yellow or yellow tinged with red, with a deep cavity surrounded by the long conspicuous calyx-lobes, thin austere flesh, and thick-walled nutlets rounded or obscurely grooved on the back.

Cratægus flava extends from the coast region of southern Virginia southward to the shores of Tampa Bay, Florida, and ranges inland to the western slopes of the Alleghany Mountains of North Carolina and along the Gulf coast through southern Alabama and Mississippi. It usually grows in dry sandy soil on the borders of the Pine forests, or occasionally in lower situations near streams subject to overflow, and although generally distributed is nowhere very common, usually appearing singly or in groups of two or three individuals.

The wood of *Cratægus flava* is heavy, hard, and close-grained, with a satiny surface susceptible of receiving a good polish; it is light brown tinged with red or rose-color, with thick lighter colored sapwood, and contains numerous very obscure medullary rays. The specific gravity of the absolutely dry wood is 0.7809, a cubic foot weighing 48.67 pounds.

A variety of *Cratægus flava*[1] may be distinguished by its thicker broader leaves; these are usually rounded at the apex, more uniformly lobed and coated with pubescence while young, and at maturity are thicker and more lustrous on the upper surface; by its usually smaller flowers, and by its larger subglobose bright red or yellow fruit with thicker and sweeter flesh.

This variety, *Cratægus flava*, var. *elliptica*, is generally a shrub with spreading branches, or rarely a small tree, and often forms thickets in abandoned fields in the middle districts of the Carolinas and Georgia, where it is most common, although it may be found throughout the region inhabited by *Cratægus flava*, the two forms gradually passing one into the other.

The wood of *Cratægus flava*, var. *elliptica*, is rather lighter than that of the species, although not otherwise distinguishable, the specific gravity of the absolutely dry wood being 0.7683, and a cubic foot weighing 47.88 pounds.

The fruit of the Summer Haw, as this variety is called in South Carolina and Georgia, is gathered in large quantities in those states and made into a jelly which can hardly be distinguished from that made from the West Indian Guava-tree.

Cratægus flava, according to Aiton,[2] was introduced into English gardens by Philip Miller in 1758, and the earliest descriptions of it were drawn up from cultivated plants.[3]

[1] *Cratægus flava*, var. *elliptica*.

? *Mespilus hyemalis*, Walter, *Fl. Car.* 148. — Poiret, *Lam. Dict.* iv. 447.

Cratægus viridis ?, Walter, *Fl. Car.* 147 (not Linnæus).

Cratægus elliptica, Aiton, *Hort. Kew.* ii. 168. — Willdenow, *Spec.* ii. pt. ii. 1002. — Persoon, *Syn.* ii. 37. — Pursh, *Fl. Am. Sept.* i. 337. — Nuttall, *Gen.* i. 305. — De Candolle, *Prodr.* ii. 627. — Hooker, *Fl. Bor.-Am.* i. 201 (in part). — Don, *Gen. Syst.* ii. 598. — Torrey & Gray, *Fl. N. Am.* i. 469. — Dietrich, *Syn.* iii. 159. — Regel, *Act. Hort. Petrop.* i. 122.

Mespilus elliptica, Poiret, *Lam. Dict.* iv. 447. — Wenzig, *Linnæa*, xxxviii. 125. — Koch, *Dendr.* i. 140.

Cratægus glandulosa, Michaux, *Fl. Bor.-Am.* i. 288 (not Aiton nor Willdenow). — Nuttall, *Gen.* i. 105. — Curtis, *Rep. Geolog. Surv. N. Car.* 1860, iii. 84. — Chapman, *Fl.*

Cratægus Michauxii, Persoon, *Syn.* ii. 38.

Cratægus spathulata, Pursh, *Fl. Am. Sept.* i. 336 (not Michaux). — De Candolle, *Prodr.* ii. 627. — *Bot. Reg.* t. 1890. — Lindley, *Bot. Reg.* under t. 1957.

Mespilus Michauxii, Hornemann, *Hort. Hafn.* 455. — Poiret, *Lam. Dict.* Suppl. iv. 69.

Cratægus flava, Elliott, *Sk.* i. 551 (not Aiton).

Cratægus Virginica, Loudon, *Arb. Brit.* ii. 842, f. 560, 615. — Kaleniczenko, *Bull. Mosc.* xlviii. pt. ii. 58.

Cratægus flava, var. *pubescens*, Gray, *Man.* ed. 5, 160. — Sargent, *Forest Trees N. Am. 10th Census U. S.* ix. 83. — Watson & Coulter, *Gray's Man.* ed. 6, 166.

Phœnopyrum Virginicum, Roemer, *Fam. Nat. Syn.* iii. 155.

Phœnopyrum ellipticum, Roemer, *Fam. Nat. Syn.* iii. 155.

[2] *Hort. Kew.* ii. 169.

[3] *Mespilus Caroliniana apii folio, vulgari similis, major, fructu luteo*, Trew, *Pl. Select.* 3, t. 17.

EXPLANATION OF THE PLATES.

Plate CLXXXIX. Cratægus flava.

1. A flowering branch, natural size.
2. A flower-bud, enlarged.
3. Vertical section of a flower, enlarged.
4. A fruiting branch, natural size.
5. A fruit divided transversely, enlarged.
6. A nutlet, natural size.
7. A nutlet divided transversely, enlarged.
8. A winter branchlet, natural size.

Plate CXC. Cratægus flava, *var.* elliptica.

1. A flowering branch, natural size.
2. A flower-bud, enlarged.
3. Vertical section of a flower, the petals removed, enlarged.
4. A fruiting branch, natural size.
5. A subglobose fruit, natural size.
6. A fruit, part of the flesh removed, showing the nutlets, enlarged.
7. A nutlet, natural size.
8. A nutlet divided transversely, enlarged.
9. A leaf from a vigorous young shoot with stipules, natural size.
10. A winter branchlet, natural size.

C.E. Faxon del. *Picart fr. sc.*

CRATÆGUS FLAVA, Ait.

A. Riocreux direx.t *Imp. R. Taneur, Paris.*

C.E.Faxon del.

Picart fr. sc.

CRATÆGUS FLAVA, Var. ELLIPTICA, Sarg.

A.Riocreux direx.t

Imp. R.Taneur, Paris.

CRATÆGUS UNIFLORA.

Haw.

LEAVES obovate-spatulate.

Cratægus uniflora, Muenchhausen, *Hausv.* v. 147. — Du Roi, *Harbk. Baumz.* i. 184.

Mespilus xanthocarpa, Linnæus f. *Syst.* ed. 13, Suppl. 254. — Ehrhart, *Beitr.* i. 182; ii. 67. — Burgsdorf, *Anleit.* pt. ii. 146. — Du Roi, *Harbk. Baumz.* ed. 2, i. 623. — Poiret, *Lam. Dict.* Suppl. iv. 67. — Sprengel, *Syst.* ii. 506.

Mespilus flexispina, Moench, *Bäume Weiss.* 62, t. 4; *Meth.* 685. — Wenzig, *Linnæa*, xxxviii. 127.

Mespilus Oxyacantha aurea, Marshall, *Arbust. Am.* 89.

Mespilus laciniata, Walter, *Fl. Car.* 147. — Poiret, *Lam. Dict.* iv. 447.

Cratægus parvifolia, Aiton, *Hort. Kew.* ii. 169. — Willdenow, *Berl. Baumz.* 85; *Spec.* ii. pt. ii. 1002. — Pursh, *Fl. Am. Sept.* i. 538. — Elliott, *Sk.* i. 547. — De Candolle, *Prodr.* ii. 627. — Don, *Gen. Syst.* ii. 598. — Darlington, *Fl. Cestr.* ed. 2, 291. — Torrey & Gray, *Fl. N. Am.* i. 469. — Dietrich, *Syn.* iii. 159. — Curtis, *Rep. Geolog. Surv. N. Car.* 1860, iii. 384. — Chapman, *Fl.* 128. — Watson & Coulter, *Gray's Man.* ed. 6, 166.

Cratægus tomentosa, Michaux, *Fl. Bor.-Am.* i. 289 (not Linnæus). — Regel, *Act. Hort. Petrop.* i. 122 (in part).

Mespilus parvifolia, Willdenow, *Enum.* 523; *Berl. Baumz.* ed. 2, 242. — Spach, *Hist. Vég.* ii. 55.

Mespilus axillaris, Persoon, *Syn.* ii. 39. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 447.

Cratægus unilateralis, Persoon, *Syn.* ii. 37. — De Candolle, *Prodr.* ii. 629. — Don, *Gen. Syst.* ii. 599. — Roemer, *Fam. Nat. Syn.* iii. 116.

Mespilus tomentosa, Poiret, *Nouveau Duhamel*, iv. 153 (not Castiglioni).

Mespilus unilateralis, Poiret, *Lam. Dict.* Suppl. iv. 73.

Mespilus flexuosa, Poiret, *Lam. Dict.* Suppl. iv. 73.

Cratægus flexuosa, De Candolle, *Prodr.* ii. 627. — Don, *Gen. Syst.* ii. 598.

Phænopyrum uniflorum, Roemer, *Fam. Nat. Syn.* iii. 153.

Phænopyrum parvifolium, Roemer, *Fam. Nat. Syn.* iii. 152.

Mespilus uniflora, Wenzig, *Linnæa*, xxxviii. 123.

A low shrub, with slender stems one or two feet high; or rarely a bushy tree attaining a height of ten or twelve feet, with a short stout trunk ten or twelve inches in diameter and covered with thin ashy gray furrowed bark, the surface of which separates into small appressed scales. The branches, when they first appear, are coated with thick pale pubescence which often does not disappear until the end of their second summer; they are slender, nearly straight or often zigzag, bright red-brown, dark gray in their first year and ultimately dark brown, and are armed with slender straight spines one to two inches in length, and often furnished, when they first appear, with leafy serrate green or red caducous bracts. The winter-buds are small, obtuse, and covered by chestnut-brown scales with scarious margins; the scales of the inner ranks are obovate at maturity, glandular-serrate, pubescent, pyriform to subglobose, pale greenish yellow, half an inch long, and caducous. The leaves are obovate-spatulate to oblong-cuneiform, rounded at the apex or sometimes abruptly acute, with short broad points, and are gradually contracted below into broad petioles or are sometimes nearly sessile; they are crenately serrate, the broad teeth being sometimes tipped with minute dark glands, and are occasionally incisely lobed towards the apex; when they unfold they are pilose on the upper surface with pale deciduous hairs and pubescent on the lower surface, and at maturity they are subcoriaceous, scabrous, dark green and lustrous above, and paler and pubescent below, especially along the midribs and primary veins, and vary from an inch to two inches in length and from half an inch to two thirds of an inch in width. The stipules are ovate, acute, glandular-serrate, sometimes a quarter of an inch long, and caducous. The flowers, which are solitary or rarely geminate and vary from a half to three quarters of an inch in diameter, appear from the first of April in Florida to the middle of June at the north when the leaves are fully grown; they are borne on short stout pedicels which are furnished with lanceolate acute glandular-serrate caducous bractlets, which, like the calyx, are hirsute-tomentose with long pale hairs; the calyx is narrowly obconic, with foliaceous lanceolate acute sharply incised and glandular persistent lobes

covered with pale hairs on the inner surface, reflexed after anthesis, and longer than the obovate creamy white petals and than the styles, which are usually five in number. The fruit ripens and falls in October, and is half an inch across, with a broad deep cavity surrounded by the large and conspicuous calyx-lobes, thick dry sweet flesh, and small thin-walled nutlets acute above, rounded below, and deeply grooved on the back.

Cratægus uniflora is distributed from the valley of the Delaware River in New Jersey southward to Florida, Louisiana, and southern Arkansas; it grows usually in sandy soil in abandoned fields or along the borders of the forest, and only on the banks of the Appalachicola River in Bristol, Florida, on the slopes of a ravine occupied by Torreya and the Florida Yew, has it been noticed in tree-like form.

Cratægus uniflora was probably detected by Banister,[1] who sent it, in 1713, to Bishop Compton,[2] in whose garden it first flowered in Europe, and the earliest description was made from plants cultivated in England.[3] It is still found in most botanic gardens, but is cultivated as a curiosity rather than for ornament. It is hardy as far north as eastern Massachusetts.

[1] See i. 6.

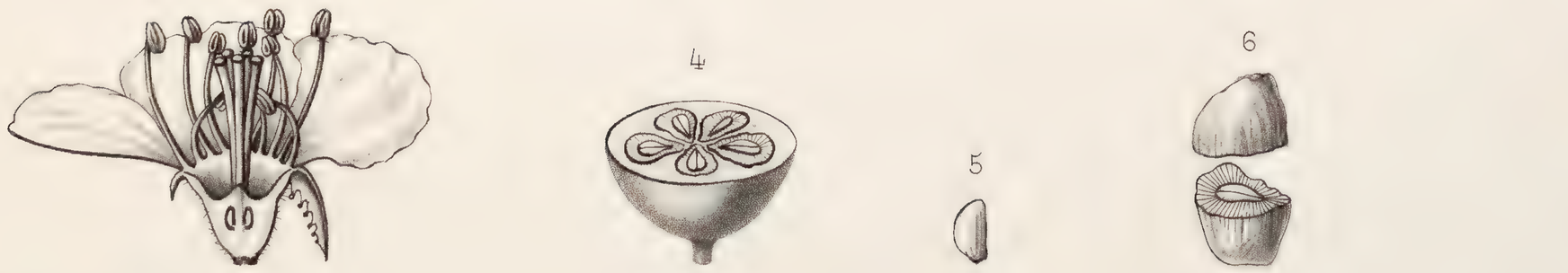
[2] See i. 6.

[3] *Mespilus foliis lanceolato-ovatis serratis subtus villosis, floribus solitariis, calycibus foliaceis, spinis longissimis tenuioribus* (Miller, *Dict.* ed. 7, No. 17). Banister's description as quoted by Miller (*Oxyacantha folio parvo subrotundo, flore unico, thecâ foliaceâ incluso summitatibus ramulorum insidente*) does not appear to have been published.

EXPLANATION OF THE PLATE.

PLATE CXCI. CRATÆGUS UNIFLORA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. Cross section of a fruit, enlarged.
5. A nutlet, natural size.
6. A nutlet divided transversely, enlarged.



C.E. Faxon del. *Toulet sc.*

CRATÆGUS UNIFLORA, Muench.

A. Riocreux direx.t *Imp. R. Taneur, Paris.*

CRATÆGUS ÆSTIVALIS.

May Haw. Apple Haw.

LEAVES elliptical to oblong-cuneiform.

Cratægus æstivalis, Torrey & Gray, *Fl. N. Am.* i. 468. — Walpers, *Rep.* ii. 58. — Dietrich, *Syn.* iii. 162. — Nuttall, *Sylva*, ii. 12. — Chapman, *Fl.* 127. — Regel, *Act. Hort. Petrop.* i. 124. — Wenzig, *Linnæa*, xxxviii. 202. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 82.
Mespilus æstivalis, Walter, *Fl. Car.* 148. — Poiret, *Lam. Dict.* iv. 447.
? Cratægus lucida, Elliott, *Sk.* i. 548 (not Ehrhart).
Cratægus elliptica, Elliott, *Sk.* i. 549 (not Aiton).
Cratægus opaca, Hooker & Arnott, *Compan. Bot. Mag.* i. 25.
Anthomeles æstivalis, Roemer, *Fam. Nat. Syn.* iii. 141.

A tree, twenty to thirty feet in height, with a stout trunk sometimes a foot in diameter and occasionally three or four feet tall, or more often divided close to the surface of the ground into several large upright branches which form a round compact bushy head. The bark of the trunk is a quarter of an inch thick, deeply fissured, and broken on the surface into thick dark red-brown persistent plate-like scales. The branchlets are at first covered with rufous or occasionally with pale hairs, and in their first winter are glabrous, lustrous, bright red or sometimes light brown, becoming darker brown or dark gray in their second year; they are stout, straight, or more or less zigzag, and often unarmed, or armed with stout straight lustrous spines an inch to an inch and a half long. The winter-buds are one eighth of an inch in length, oblong, obtuse, and covered with broad thick ovate scales keeled on the back, minutely apiculate, and bright chestnut-brown; the scales of the inner ranks at maturity are broadly obovate, rounded and conspicuously glandular-serrate at the apex, and from one quarter to one half of an inch in length. The leaves are elliptical to oblong-cuneiform or on sterile branches often obovate, and are acute or rounded at the apex, gradually narrowed below into stout petioles, and irregularly sinuate-toothed or angled above the middle, or crenately serrate with minute glandular-tipped teeth, or, especially on vigorous shoots, rarely three-lobed or incised; when they unfold they are covered on the upper surface with deciduous pale hairs and on the lower surface with dense rufous tomentum, and when fully grown are subcoriaceous, dark green and lustrous, glabrous or sometimes puberulous above and clothed below, especially along the broad midribs and primary veins, with thick rusty pubescence; they are an inch and a half to two inches long, half an inch to an inch wide, and are borne on petioles which are coated with rusty tomentum and vary from a quarter of an inch to an inch in length. The flowers, which appear with the unfolding of the leaves in February and early in March, are an inch across when expanded, and are produced in two to five-flowered simple glabrous corymbs on long stout pedicels furnished with lanceolate acute caducous glandular bractlets; the calyx is glabrous, turbinate, with nearly triangular persistent lobes which are minutely glandular-serrate, reflexed after anthesis, often flushed with red towards the apex, and much shorter than the obovate concave white petals. The fruit, which ripens in May, is depressed-globose, very fragrant, bright red dotted with pale spots, and half of an inch to two thirds of an inch in diameter, with a small shallow cavity surrounded by the remnants of the calyx-lobes and filaments, juicy subacid flesh, and three to five thin-walled nutlets rounded at both ends and deeply two-grooved on the back.

Cratægus æstivalis is distributed in the coast region from the valley of the Savannah River in South Carolina to northern Florida, and through the Gulf states to southern Arkansas and to the valley of the Sabine River in Texas; it grows usually in moist sandy soil near the margins of streams and Pine-barren ponds, where the ground is often submerged during several weeks in winter. It is com-

paratively rare in the Atlantic states, and is most common and attains its greatest size in western Louisiana and eastern Texas.

The wood of *Cratægus æstivalis* is heavy, hard, and close-grained, although not strong; it is light brown or red, with thick lighter colored sapwood, and contains numerous obscure medullary rays. The specific gravity of the absolutely dry wood is 0.6564, a cubic foot weighing 40.91 pounds.

The fruit, which is collected in large quantities in all the region where the May Haw is found, is sold in the markets of the towns of southwestern Louisiana and is preserved and made into jellies.

Cratægus æstivalis appears to have been first noticed by Walter, who published the earliest account of it in his *Flora Caroliniana;* it is probably still unknown in gardens, although one of the most beautiful trees of the genus. No other species produces such large flowers or such large well-flavored and valuable fruit; and as a fruit-tree the May Haw deserves the attention of pomologists in all warm-temperate countries.

EXPLANATION OF THE PLATE.

PLATE CXCII. CRATÆGUS ÆSTIVALIS.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. Cross section of a fruit, natural size.
5. A nutlet, natural size.
6. A nutlet divided transversely, enlarged.
7. A winter branchlet, natural size.

C.E. Faxon del. Picart fr. sc.

CRATÆGUS ÆSTIVALIS, Torr. et Gray.

A. Riocreux direx.t Imp. R. Taneur, Paris.

HETEROMELES.

FLOWERS regular, perfect; calyx 5-lobed, the lobes imbricated in æstivation; petals 5, convolute in æstivation; stamens 10, parapetalous; ovary 2-celled; ovules 2 in each cell, ascending. Fruit a fleshy drupe. Leaves alternate, serrate, coriaceous, persistent.

Heteromeles, Roemer, *Fam. Nat. Syn.* iii. 100.

A small tree, with smooth pale aromatic bark, stout terete branches, pubescent or puberulous while young, and fibrous roots. Leaves alternate, oblong-lanceolate, acute at the two ends, sharply and remotely serrate with rigid glandular teeth, or rarely almost entire, dark green and lustrous on the upper, paler on the lower surface, petiolate with stout grooved glandular petioles often furnished near their apex with one or two slender glandular teeth, feather-veined, with broad midribs grooved on the upper side and conspicuous reticulated veinlets; stipules subulate, ridged, minute, early deciduous. Flowers in ample tomentose terminal corymbose panicles, their branches developed from the axils of the upper leaves or from acute leafy bracts. Bractlets acute, minute, usually tipped with small glands, caducous. Pedicels stout, shorter than the turbinate calyx-tube, tomentose below, glabrate above; the lobes short, nearly triangular, spreading, persistent. Disk lining the tube of the calyx, cup-shaped, obscurely sulcate; petals five, inserted on the margin of the disk, flabellate, erose-denticulate or emarginate at the apex, contracted at the base into short broad claws, thick, glabrous, pure white. Stamens ten, inserted in one row with the petals on the margin of the disk in pairs opposite the lobes of the calyx; filaments subulate, enlarged at the base, incurved, free; anthers oblong-ovate, emarginate, attached on the back below the middle, introrse, two-celled, the cells opening longitudinally. Carpels two, adnate to the calyx-tube, at first only dorsally below the middle, and slightly united into a subglobose tomentose nearly superior ovary; styles terminal, distinct, slightly spreading, enlarged at the apex into broad truncate stigmas; ovules two in each cell, ascending, anatropous; raphe dorsal; micropyle inferior. Fruit an obovoid fleshy drupe formed by the thickening of the calyx-tube connate to their middle only with the membranaceous carpels which are coated above with long white hairs filling the cavity closed by the infolding of the thickened persistent lobes, their tips erect and crowning the fruit. Seeds usually solitary in each cell by the abortion of one of the ovules, or rarely two, ovate, lenticular, obtuse, slightly ridged on the back, destitute of albumen; testa membranaceous, puncticulate, light brown; hilum orbicular, conspicuous. Embryo filling the cavity of the seed; cotyledons plano-convex; radicle short, inferior.

The wood of Heteromeles is very heavy, hard, and close-grained, with a satiny surface susceptible of receiving a beautiful polish; it is dark red-brown, with thin lighter colored sapwood composed of seven or eight layers of annual growth. The specific gravity of the absolutely dry wood is 0.9326, a suborbicular, cubic foot weighing 58.12 pounds.

The genus is not known to possess useful properties.

The generic name, from ἕτερος and μῆλον, refers to the fact that this tree differs from the plants of allied genera. It consists of a single species.

HETEROMELES ARBUTIFOLIA.

Tollon. Toyon.

Heteromeles arbutifolia, Roemer, *Fam. Nat. Syn.* iii. 105. — Decaisne, *Nouv. Arch. Mus.* x. 144, t. 9. — Brewer & Watson, *Bot. Cal.* i. 188; ii. 444. — Sargent, *Forest Trees N. Am.* 10*th Census U. S.* ix. 83. — Greene, *Fl. Francis.* i. 53.

Cratægus arbutifolia, Aiton, *Hort. Kew.* ed. 2, iii. 202 (not Poiret). — Loddiges, *Bot. Cab.* t. 201.

Aronia arbutifolia, Nuttall, *Gen.* i. 306.

Photinia arbutifolia, Lindley, *Trans. Linn. Soc.* xiii. 103; *Bot. Reg.* t. 491; and under t. 1956. — Sprengel, *Syst.* ii. 508. — De Candolle, *Prodr.* ii. 631. — Chamisso & Schlechtendal, *Linnæa*, ii. 542. — Don, *Gen. Syst.* ii. 602. — Spach, *Hist. Vég.* ii. 80. — Hooker & Arnott, *Bot. Voy. Beechey*, 139, 340. — Torrey & Gray, *Fl. N. Am.* i. 473. — Dietrich, *Syn.* iii. 162. — Bentham, *Bot. Voy. Sulphur*, 14; *Pl. Hartweg.* 307. — Torrey, *Emory's Rep.* 140; *Sitgreaves' Rep.* 159; *Pacific R. R. Rep.* iv. 85; *Bot. Mex. Bound. Surv.* 64; *Bot. Wilkes Explor. Exped.* 291. — Bolander, *Proc. Cal. Acad.* iii. 80. — Palmer, *Am. Nat.* xii. 599. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xix. 180 (*Mél. Biol.* ix. 180). — Wenzig, *Linnæa*, xxxviii. 96.

Mespilus arbutifolia, Link, *Enum.* ii. 36.

Photinia salicifolia, Presl, *Epimel. Bot.* 204. — Walpers, *Ann.* iii. 858.

Heteromeles Fremontiana, Decaisne, *Nouv. Arch. Mus.* iii. 144.

A tree, sometimes thirty feet in height, with a straight trunk twelve to eighteen inches in diameter, dividing, a few feet above the surface of the ground, into numerous erect branches which form a handsome narrow or round-topped head; or more often a low much-branched shrub. The bark of the trunk varies from two thirds to one half of an inch in thickness, and is light gray with a generally smooth surface broken by obscure reticulated ridges. The branchlets are at first coated with pale pubescence which gradually disappears, and in their first winter they are dark red and slightly puberulous, ultimately becoming darker and glabrous. The leaves, which appear in early summer with the flowers, are three or four inches long, an inch to an inch and a half broad, and are borne on petioles which vary from half an inch to two thirds of an inch in length and usually remain on the branches during at least two winters. The flowers, which are produced from June to August in compact panicles four to six inches across, are often more or less hidden by young lateral branches which rise above them. The fruit, which is mealy, astringent, and acid, ripens in November and December and remains on the branches until late in the winter.

Heteromeles arbutifolia is distributed through the Californian coast regions from Mendocino County to Lower California;[1] it is most common, and reaches its largest size on the islands off the California coast[2] and extends inland to the foothills of the Sierra Nevada and San Bernardino Mountains. It generally grows in the neighborhood of streams, on dry hills, and especially on their northern slopes, and is often found clinging to the steep cliffs of the coast fully exposed to the sweep of ocean gales; on the island of Santa Catalina, where it is very abundant, it forms groves of considerable extent,[3] and on the foothills of the Sierras, where it ascends to elevations of two thousand feet above the level of the sea, it usually grows as a shrub.

The fruit-covered branches are gathered in large quantities and are used in California for Christmas decorations.[4]

Heteromeles arbutifolia was discovered by Archibald Menzies, the Scotch surgeon who accompanied Vancouver to the northwest coast of America, and, in 1796, introduced it into English gardens.[5]

In winter, when its branches are covered with great clusters of scarlet fruit, whose effectiveness is

[1] T. S. Brandegee, *Proc. Cal. Acad.* ser. 2, iii. 136.

[2] Greene, *Bull. Cal. Acad.* ii. 397; *Pittonia*, i. 77, 88. — T. S. Brandegee, *Proc. Cal. Acad.* ser. 2, i. 209; *Zoë*, i. 136.

[3] T. S. Brandegee, *Zoë*, i. 111.

[4] K. Brandegee, *Zoë*, ii. 349.

[5] Loudon, *Arb. Brit.* ii. 868, f. 619.

increased by the contrasting color of the ample lustrous dark green foliage, the Tollon[1] is more beautiful perhaps than any other North American tree. It is still too seldom seen in the gardens of California and is rare in those of other parts of the world, although in southern Europe it is perfectly at home and flowers and fruits abundantly.

[1] *Heteromeles arbutifolia* is sometimes also called California Holly and Christmas Berry.

EXPLANATION OF THE PLATE.

PLATE CXCIII. HETEROMELES ARBUTIFOLIA.

1. A flowering branch, natural size.
2. Diagram of a flower.
3. A flower-bud, enlarged.
4. Vertical section of a flower, enlarged.
5. A stamen, enlarged.
6. A pistil, enlarged.
7. An ovule, much magnified.
8. A fruiting branch, natural size.
9. Cross section of a fruit, enlarged.
10. Vertical section of a fruit, enlarged.
11. A seed divided transversely, enlarged.
12. An embryo, much magnified.

C.E. Faxon del.

Picart fr. sc.

HETEROMELES ARBUTIFOLIA, Rœm.

A. Riocreux direx.t

Imp. R. Taneur, Paris

AMELANCHIER.

FLOWERS perfect, regular; calyx 5-lobed, the lobes imbricated in æstivation; petals 5, imbricated in æstivation; stamens usually 20; ovary inferior or partly superior, 5-celled, each cell incompletely divided by a false dissepiment; ovules 2 in each cell, ascending. Fruit a pome. Leaves simple, alternate, deciduous.

Amelanchier, Medicus, *Phil. Bot.* i. 135, 155. — Lindley, *Trans. Linn. Soc.* xiii. 100. — Meisner, *Gen.* 106. — Endlicher, *Gen.* 1237. — Bentham & Hooker, *Gen.* i. 628 (excl. *Peraphyllum*). — Baillon, *Hist. Pl.* i. 477 (excl. *Peraphyllum*).

Aronia, Persoon, *Syn.* ii. 39 (in part).

Trees or shrubs, with scaly bark, slender terete branchlets, acute buds with imbricated scales, those of the inner rows accrescent and bright colored, and fibrous roots. Leaves alternate, conduplicate in vernation, simple, entire or serrate, penniveined, often lanate, petiolate, deciduous; stipules subulate, elongated, caducous. Flowers in erect or nodding racemes, their pedicels slender, bibracteolate, developed from the axils of lanceolate acuminate deciduous bracts. Calyx-tube campanulate or urceolate, the lobes acute or subulate, recurved, persistent. Disk lining the tube of the calyx, green, entire or crenulate, nectariferous. Petals white, obovate-oblong, spatulate or ligulate, rounded, acute or truncate at the apex, gradually contracted below into short slender claws, inserted on the thickened margin of the disk, spreading. Stamens usually twenty, inserted with the petals in three rows, those of the outer row of ten parapetalous, those of the other rows alternate with them and with each other; filaments subulate, free, persistent on the fruit; anthers oblong, attached on the back near the middle, introrse, two-celled, the cells opening longitudinally. Ovary more or less adnate to the calyx-tube, glabrous or puberulous above, two to five-celled, each cell more or less divided after the fecundation of the ovules into two compartments by the development of a false partition from the back; styles two to five, connate below, spreading and dilated above into broad truncate stigmas; ovules two in each cell, erect, anatropous, the micropyle inferior. Fruit subglobose or pyriform, open at the summit, the cavity surrounded by the lobes of the calyx and the remnants of the filaments; mesocarp sweet, rather juicy, red or dark purple; endocarp membranaceous or cartilaginous, the carpels free or connate, glabrous or villose at the apex. Seeds ten or often five by the abortion of one of the ovules in each cell, ovate-elliptical, not rarely subuncinate at the base, destitute of albumen; testa coriaceous, dark chestnut-brown, mucilaginous. Embryo filling the cavity of the seed; cotyledons plano-convex, the radicle inferior.

Amelanchier is widely distributed through the boreal and temperate portions of eastern and the mountainous regions of western North America, and occurs in Japan and central China, in Asia Minor, the Caucasus, southern Europe, and northern Africa. Five or six species are distinguished; one is European,[1] north African, and Anatolian; a second inhabits the Orient;[2] and a third, perhaps not distinct from the arborescent species of eastern America, is found in the forests of Japan and of central

[1] *Amelanchier Amelanchier.*

Mespilus Amelanchier, Linnæus, *Spec.* 478.

Sorbus Amelanchier, Crantz, *Stirp. Austr.* ii. 53.

Pyrus Amelanchier, Linnæus f. *Syst.* ed. 13, Suppl. 256. — Willdenow, *Spec.* ii. pt. ii. 1014.

Cratægus rotundifolia, Lamarck, *Dict.* i. 84.

Amelanchier vulgaris, Moench, *Meth.* 682. — De Candolle, *Prodr.* ii. 632. — Boissier, *Fl. Orient.* ii. 667.

Amelanchier rotundifolia, Du Mont de Courset, *Bot. Cult.* ed. 2, v. 459.

Cratægus Amelanchier, De Candolle, *Fl. Franc.* iv. 432.

Aronia rotundifolia, Persoon, *Syn.* ii. 39.

Amelanchier rotundifolia, Decaisne, *Nouv. Arch. Mus.* x. 134.

[2] *Amelanchier parviflora*, Boissier, *Diag.* iii. 9; *Fl. Orient.* ii. 668.

China,[1] while two belong to the flora of eastern and one to that of western America. Two of the American species attain the size of small trees; the third[2] is a shrub of the northern and alpine parts of eastern America. The Old World species are shrubs.

The fruit of all the species is more or less succulent and edible, and the wood produced by the American arborescent species is strong, hard, and close-grained. The large white flowers, appearing before or coetaneous with the leaves, give the different species great beauty in very early spring, and make them desirable garden plants.

The American species of Amelanchier do not suffer seriously from the attacks of insects,[3] although they are subject to many of the fungal diseases which affect Pyrus and Cratægus.[4]

The generic name is derived from Amelancier, the popular name of the European species in Savoy.

[1] *Amelanchier Asiatica*, Walpers, *Rep.* ii. 55. — Roemer, *Fam. Nat. Syn.* iii. 144. — Koch, *Dendr.* i. 180.

Aronia Asiatica, Siebold & Zuccarini, *Fl. Jap.* i. 87, t. 42.

Amelanchier Canadensis, var. *Japonica*, Miquel, *Prol. Fl. Jap.* 229. — Franchet & Savatier, *Enum. Pl. Jap.* i. 142. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xix. 175 (*Mél. Biol.* ix. 174).

[2] *Amelanchier oligocarpa*, Roemer, *Fam. Nat. Syn.* iii. 145. — Watson, *Garden and Forest*, i. 245, f. 41. — Watson & Coulter, *Gray's Man.* ed. 6, 167.

Mespilus Canadensis, var. *oligocarpa*, Michaux, *Fl. Bor.-Am.* i. 291.

Amelanchier? sanguinea, De Candolle, *Prodr.* ii. 633 (in part).

Amelanchier Canadensis, var. *oligocarpa*, Torrey & Gray, *Fl. N. Am.* i. 474. — Torrey, *Fl. N. Y.* i. 226. — Gray, *Man.* 131.

Amelanchier sanguinea, Decaisne, *Nouv. Arch. Mus.* x. 136 (not De Candolle nor Lindley).

[3] The same insects which injure Pyrus in North America are also found on the different species of Amelanchier; and Leaf-miners like *Nepticula amelanchierella*, Clemens, and *Ornix quadripunctella*, Clemens, may be peculiar to them.

[4] A striking fungus attacks the leaves and young branches of *Amelanchier Canadensis* in the east, and of *Amelanchier alnifolia* in the west, covering them at first with an olive-colored down which afterwards changes to a black crenulated surface. Many leaves on certain branches are attacked simultaneously, and the so-called bird's-nest distortions are produced. This fungus, which belongs to the order *Pyrenomycetes*, was first called *Sphæria Collinsii* by Schweinitz, and by other authors has been referred to Dimerosporium, Lasiosphæria, and Plowrightia.

CONSPECTUS OF THE NORTH AMERICAN ARBORESCENT SPECIES.

Leaves ovate to ovate-oblong or oblong to broadly elliptical or suborbicular, acute or rounded at the apex, cordate or rounded at the base . . . . . 1. A. CANADENSIS.

Leaves broadly orbicular, obtuse, or rarely acute . . . . . 2. A. ALNIFOLIA.

AMELANCHIER CANADENSIS.

Shad Bush. Service Berry.

LEAVES ovate to ovate-oblong, acute, cordate or rounded at the base.

Amelanchier Canadensis, Medicus, *Gesch. Bot.* 79. — Darlington, *Fl. Cestr.* ed. 3, 86. — Curtis, *Rep. Geolog. Surv. N. Car.* 1860, iii. 68. — Koch, *Dendr.* i. 180. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xix. 176 (*Mél. Biol.* ix. 174). — Emerson, *Trees Mass.* ed. 2, ii. 503, t. — Sargent, *Forest Trees N. Am. 10th Census U. S.* ix. 84. — Watson & Coulter, *Gray's Man.* ed. 6, 166.

Mespilus Canadensis, Linnæus, *Spec.* 478. — Miller, *Dict.* ed. 8, No. 6. — Du Roi, *Harbk. Baumz.* i. 416. — Walter, *Fl. Car.* 148.

Pyrus Botryapium, Linnæus f. *Syst.* ed. 13, Suppl. 255. — Wangenheim, *Nordam. Holz.* 90, t. 28, f. 65. — Ehrhart, *Beitr.* i. 183; ii. 68. — Willdenow, *Berl. Baumz.* 258; *Spec.* ii. pt. ii. 1013; *Enum.* 525. — Aiton, *Hort. Kew.* ed. 2, iii. 207. — Pursh, *Fl. Am. Sept.* i. 339. — Bigelow, *Fl. Boston.* 120. — Hayne, *Dendr. Fl.* 83. — Guimpel, Otto & Hayne, *Abbild. Holz.* 100, t. 79. — Sprengel, *Syst.* ii. 509. — Audubon, *Birds*, t. 60.

Cratægus racemosa, Lamarck, *Dict.* i. 84. — Desfontaines, *Hist. Arb.* ii. 148. — *Nouveau Duhamel*, iv. 133. — Poiret, *Lam. Dict.* Suppl. i. 292.

Mespilus nivea, Marshall, *Arbust. Am.* 90.

Amelanchier Canadensis, var. **prunifolia**, Castiglioni, *Viag. negli Stati Uniti*, ii. 293.

Mespilus Amelanchier, Castiglioni, *Viag. negli Stati Uniti*, ii. 293 (not Linnæus).

Mespilus Canadensis, var. **cordata**, Michaux, *Fl. Bor.-Am.* i. 291.

Amelanchier Botryapium, Borkhausen, *Handb. Forstbot.* ii. 1260. — Du Mont de Courset, *Bot. Cult.* v. 458. — Lindley, *Trans. Linn. Soc.* xiii. 100. — De Candolle, *Prodr.* ii. 632. — Hooker, *Fl. Bor.-Am.* i. 202. — Don, *Gen. Syst.* ii. 604. — Spach, *Hist. Vég.* ii. 84. — Roemer, *Fam. Nat. Syn.* iii. 145. — Wenzig, *Linnæa*, xxxviii. 110. — Decaisne, *Nouv. Arch. Mus.* x. 135.

Aronia Botryapium, Persoon, *Syn.* ii. 39. — Nuttall, *Gen.* i. 306. — Elliott, *Sk.* i. 557. — Darlington, *Fl. Cestr.* 63.

Mespilus arborea, Michaux f. *Hist. Arb. Am.* iii. 68, t. 11. — W. P. C. Barton, *Fl. Phil. Prodr.* 55.

Aronia arborea, W. P. C. Barton, *Compend. Fl. Phil.* i. 228.

Amelanchier sanguinea, Lindley, *Bot. Reg.* t. 1171 (not De Candolle).

Aronia cordata, Rafinesque, *Med. Fl.* ii. 196.

Amelanchier ovalis, Hooker, *Fl. Bor.-Am.* i. 202 (in part).

Amelanchier Canadensis, var. **Botryapium**, Torrey & Gray, *Fl. N. Am.* i. 473. — Walpers, *Rep.* ii. 55. — Dietrich, *Syn.* iii. 158. — Torrey, *Fl. N. Y.* i. 225. — Chapman, *Fl.* 129.

Pyrus Bartramiana, Tausch, *Regensb. Flora*, 1838, pt. ii. 715.

Pyrus Wangenheimiana, Tausch, *Regensb. Flora*, 1838, pt. ii. 715.

Amelanchier Bartramiana, Roemer, *Fam. Nat. Syn.* iii. 145.

Amelanchier Wangenheimiana, Roemer, *Fam. Nat. Syn.* iii. 146.

A tree, sometimes forty to fifty feet in height, with a tall trunk twelve to eighteen inches in diameter, and small spreading branches which form a narrow oblong round-topped head. The bark of the trunk is from a quarter to half an inch in thickness, pale red-brown, and divided by shallow fissures into narrow longitudinal ridges, the surface of which is broken into small square persistent scales. The branchlets are slender and at first bright green and glabrous or slightly puberulous, but are dark red and marked with many minute pale lenticels in their first winter, and later become dark brown or red-brown. The winter-buds are a quarter of an inch long and covered with pale chestnut-brown ovate apiculate slightly pubescent scales, scarious on the margins and obscurely keeled on the back; the scales of the inner ranks are lanceolate, acute, bright red above the middle, ciliate with silky hairs, and sometimes an inch long when fully grown, and leave when falling narrow ring-like scars which mark the base of the branchlets during two or three years. The leaves are ovate to ovate-oblong, acute or often taper-pointed at the apex, cordate or rounded at the base, and finely serrate with straight or incurved rigid subulate teeth; when they unfold they are dark red-brown and pilose on both surfaces with scattered deciduous white hairs, and at maturity they are thick and firm in texture, glabrous,

dark green and dull on the upper surface, pale on the lower surface, three or four inches long and an inch to an inch and a half broad, with prominent midribs grooved on the upper side and slender veins, and are borne on slender channeled petioles which vary from half an inch to an inch in length. The stipules are narrowly lanceolate, membranaceous, pubescent, at first pink but ultimately brown, and early deciduous. The leaves turn bright clear yellow in the autumn before falling. The flowers, which appear from the end of March at the south to the end of May at the north when the leaves are grown to nearly one third of their size, are produced in erect or nodding glabrous racemes three or four inches long, and are borne on slender pedicels half an inch to an inch in length, furnished with two lanceolate pubescent pink caducous bractlets, and developed from the axils of lanceolate bright-colored bracts which fall before the expansion of the flowers. The calyx is campanulate, with lanceolate acute lobes, villose on the inner surface, twice the length of the tube, and rather longer than the stamens and styles. The petals are strap-shaped or slightly obovate, rounded or acute at the apex, gradually contracted at the base, thin, pure white, half an inch to nearly an inch in length, and from a quarter to half an inch in width. The ovaries are glabrous. The fruit, which ripens in early summer, is sweet and edible; it is depressed-globular, from a third to half an inch broad, and borne on elongated slender stems conspicuously marked by the scars left by the falling of the bractlets; when first fully grown it is bright red, but when ripe becomes dark purple and is covered with a slight glaucous bloom. The seeds are an eighth of an inch long, with a dark red-brown opaque coat.

Amelanchier Canadensis is distributed from Newfoundland through the maritime provinces of Canada, where it is common, and westward along the northern shores of the Great Lakes,[1] and in the United States ranges southward to northern Florida and westward to Minnesota, eastern Nebraska,[2] eastern Kansas, Louisiana, and southern Arkansas.

Amelanchier Canadensis grows in rich soil in upland woods with Oaks, Hickories, Sugar Maples, and Birches; it is abundant in all the northern parts of the country and on the Alleghany Mountains, where, in North Carolina and Tennessee, it reaches its greatest size. In the coast region of the Atlantic Gulf states it is represented only by a low shrubby form, while west of the Alleghany Mountains it is common in all the elevated regions but does not extend into the river-bottoms, and is more abundant at the north than at the south.

The wood of *Amelanchier Canadensis* is heavy, exceedingly hard, strong, and close-grained, with a satiny surface susceptible of receiving a good polish; it is dark brown often tinged with red, with thick lighter colored sapwood composed of forty or fifty layers of annual growth, and contains numerous obscure medullary rays. The specific gravity of the absolutely dry wood is 0.7838, a cubic foot weighing 48.85 pounds. It is occasionally used for the handles of tools and other small implements.

Amelanchier Canadensis varies considerably in the form of its leaves and in the character of the pubescence which sometimes covers them, in the size of its flowers and fruit, and in its habit and stature. The most distinct of these forms is *Amelanchier Canadensis*, var. *obovalis*.[3] This is a tree sometimes twenty-five or thirty feet in height, with a single straight stem or often with a cluster of spreading stems springing from the ground and forming a broad tall bush. The leaves are oblong or broadly elliptical, acute or rounded at the apex, rounded or subcordate at the base, remotely serrate

[1] Brunet, *Cat. Vég. Lig. Can.* 27. — Bell, *Rep. Geolog. Surv. Can.* 1867–69, Appendix 9 (*Pl. Manitoulin Islands*). — Macoun, *Cat. Can. Pl.* i. 148.

[2] Bessey, *Bull. Exper. Stat. Nebraska*, iv. art. iv. 20.

[3] *Amelanchier Canadensis*, var. *obovalis*.

Mespilus Canadensis, var. *obovalis*, Michaux, *Fl. Bor.-Am.* i. 291.

Pyrus sanguinea, Pursh, *Fl. Am. Sept.* i. 340 (in part). — Sprengel, *Syst.* ii. 509.

Pyrus ovalis, Bigelow, *Fl. Boston.* ed. 2, 195 (not Willdenow).

Aronia ovalis, Torrey, *Fl. U. S.* 479.

Amelanchier intermedia, Spach, *Hist. Vég.* ii. 85. — Wenzig, *Linnæa*, xxxviii. 112.

Amelanchier Canadensis, var. *oblongifolia*, Torrey & Gray, *Fl. N. Am.* i. 473. — Walpers, *Rep.* ii. 55. — Dietrich, *Syn.* iii. 158. — Torrey, *Fl. N. Y.* i. 225; *Nicollet's Rep.* 149. — Emerson, *Trees Mass.* ed. 2, ii. 504, t. — Sargent, *Forest Trees N. Am. 10th Census U. S.* ix. 84. — Watson & Coulter, *Gray's Man.* ed. 6, 167.

Amelanchier oblongifolia, Roemer, *Fam. Nat. Syn.* iii. 147.

Amelanchier spicata, Decaisne, *Nouv. Arch. Mus.* x. 135, t. 9, f. 5 (not Lamarck).

or sometimes nearly entire below the middle, coated at first on the lower surface with thick white tomentum, and at maturity pale and more or less pubescent on the lower surface. The flowers, which are produced in shorter racemes on hairy pedicels, are smaller, with pubescent calyces, their lobes being densely tomentose on the inner surface, and narrower strap-shaped petals usually less than half an inch long. This variety is found in Nova Scotia and New Brunswick, where, however, it is not common, and is abundant in Quebec and Ontario, extending northward to the valley of the Mackenzie River in latitude 65°;[1] it is common in the northeastern states, ranging southward along the Alleghany Mountains to Virginia and westward to Minnesota and Missouri, and occasionally occurs, much reduced in size, in the southern coast region from Bluffton, South Carolina, to the shores of the Bay of Mobile.

Amelanchier Canadensis, var. *obovalis*, grows usually on the borders of streams and swamps in low wet soil, and sometimes on high rocky slopes and ridges, where it is often a small shrub producing fruit when only a foot or two high. In the situations which it selects, and in the shape and covering of its leaves, it is usually very distinct from the upland form, but the two are connected by intermediate forms growing in intermediate situations which make it difficult to find constant characters upon which to establish a second species.

The fruit of the tomentose form is rather more juicy and of better flavor than that of the upland tree; and of late years American pomologists have paid some attention to the cultivation and improvement of a large-fruited variety originally obtained from Iowa, Minnesota, and Manitoba.[2]

Amelanchier Canadensis, var. *spicata*,[3] is a variety with broader obovate sometimes suborbicular leaves which is common in the northern states, where it usually grows as a low shrub, but occasionally rises to a height of fifteen or twenty feet.

The earliest account[4] of *Amelanchier Canadensis* is that of Clayton,[5] who also distinguished the tomentose variety.[6] It was first cultivated in Europe in 1746 by the Duke of Argyll.[7]

Amelanchier Canadensis is a beautiful object in early spring when its large white flowers unfold with the red or with the silvery white leaves of the different varieties, and its beauty at this time is heightened by its brilliant silky bud-scales and bracts. As a fruit-tree, although the birds devour the fruit as fast as it ripens, it deserves more attention than it has yet received.

[1] Richardson, *Arctic Searching Exped.* ii. 294. — Macoun, *Cat. Can. Pl.* i. 149.

[2] *Am. Agric.* xxx. 144. — *Rep. Iowa Hort. Soc.* xii. 203. — *Gardeners' Monthly*, xx. 141, 186, 306.

[3] *Amelanchier Canadensis*, var. *spicata*.

Cratægus spicata, Lamarck, *Dict.* i. 84. — Desfontaines, *Hist. Arb.* ii. 148. — *Nouveau Duhamel*, iv. 132. — Poiret, *Lam. Dict.* Suppl. i. 192.

Pyrus ovalis, Willdenow, *Berl. Baumz.* 259; *Spec.* ii. pt. ii. 1014. — Pursh, *Fl. Am. Sept.* i. 340.

Mespilus Canadensis, var. *rotundifolia*, Michaux, *Fl. Bor.-Am.* i. 291.

Amelanchier ovalis, Borkhausen, *Handb. Forstbot.* ii. 1259. — Du Mont de Courset, *Bot. Cult.* ed. 2, v. 459. — Lindley, *Trans. Linn. Soc.* xiii. 100. — De Candolle, *Prodr.* ii. 635. — Hooker, *Fl. Bor.-Am.* i. 202 (excl. var.). — Don, *Gen. Syst.* ii. 604 (excl. var.). — Spach, *Hist. Vég.* ii. 85. — Loudon, *Arb. Brit.* ii. 876, f. 632.

Aronia ovalis, Persoon, *Syn.* ii. 40. — Elliott, *Sk.* i. 558.

Amelanchier Canadensis, var. *rotundifolia*, Torrey & Gray, *Fl. N. Am.* i. 473. — Walpers, *Rep.* ii. 55. — Dietrich, *Syn.* 158. — Torrey, *Fl. N. Y.* i. 225. — Chapman, *Fl.* 129. — Watson & Coulter, *Gray's Man.* ed. 6, 167.

Amelanchier rotundifolia, Roemer, *Fam. Nat. Syn.* iii. 146 (not Du Mont de Courset).

[4] It was probably one of the forms of *Amelanchier Canadensis* which John Mason, writing of Newfoundland in 1620, calls a Peare in this passage: "The Countrie fruites wild, are cherries small, whole groaues of them, Filberds good, a small pleasant fruite, called a Peare, Damaske Roses single very sweet, excellēt Strawberries, and Hartleberries with aboundance of Rasberries, and Gooseberries somewhat better than ours in *England*, all which replanted would be much inlarged." (*A Brief Discourse of the Newfoundland* [*Royal Letters, Charters, and Tracts relating to the Colonization of New Scotland*, 1621–1638].)

[5] *Mespilus inermis, foliis subtus glabris obverse ovatis, Fl. Virgin.* 54. — Duhamel, *Traité des Arbres*, ii. 15.

[6] *Mespilus inermis, folio ovato oblongis, serratis, subtus tomentosis, Fl. Virgin.* 55.

[7] Aiton, *Hort. Kew.* ii. 173. — Loudon, *Arb. Brit.* ii. 874, f. 627–629, t.

EXPLANATION OF THE PLATES.

Plate CXCIV. Amelanchier Canadensis.

1. A flowering branch, natural size.
2. Diagram of a flower.
3. Vertical section of a flower, enlarged.
4. Front and rear views of a stamen, enlarged.
5. Cross section of an ovary, enlarged.
6. An ovule, much magnified.
7. A fruiting branch, natural size.
8. Vertical section of a fruit, enlarged.
9. Cross section of a fruit, enlarged.
10. A seed, enlarged.
11. An embryo, much magnified.
12. The end of a winter branchlet, natural size.

Plate CXCV. Amelanchier Canadensis, *var.* obovalis.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A fruiting branch, natural size.
4. A fruit divided transversely, enlarged.
5. A seed, enlarged.
6. An embryo, much magnified.

C.E. Faxon del

Picart sc

AMELANCHIER CANADENSIS, Torr & Gray.

A Riocreux dirext

Imp F. Taneur, Paris.

C.E. Faxon del.

Picart sc.

AMELANCHIER CANADENSIS, Var. OBOVALIS, Sarg.

A. Riocreux direx.t

Imp. R. Taneur, Paris.

AMELANCHIER ALNIFOLIA.

Service Berry.

LEAVES broadly ovate to orbicular, obtuse or rarely acute.

Amelanchier alnifolia, Nuttall, *Jour. Phil. Acad.* vii. 22. — Roemer, *Fam. Nat. Syn.* iii. 147. — Cooper, *Am. Nat.* iii. 407. — Wenzig, *Linnæa*, xxxviii. 113. — Decaisne, *Nouv. Arch. Mus.* x. 135. — Brewer & Watson, *Bot. Cal.* i. 190. — Watson & Coulter, *Gray's Man.* ed. 6, 167. — Greene, *Fl. Francis.* i. 52.

Pyrus sanguinea, Pursh, *Fl. Am. Sept.* i. 340 (in part).

Aronia alnifolia, Nuttall, *Gen.* i. 306.

Pyrus alnifolia, Sprengel, *Syst.* ii. 509.

Amelanchier ovalis, var. **semiintegrifolia**, Hooker, *Fl. Bor.-Am.* i. 202. — Don, *Gen. Syst.* ii. 604,

Amelanchier florida, Lindley, *Bot. Reg.* t. 1589. — Spach, *Hist. Vég.* ii. 86. — Walpers, *Rep.* ii. 55. — Loudon, *Arb. Brit.* ii. 876, f. 633, 634. — Roemer, *Fam. Nat. Syn.* iii. 144. — Decaisne, *Nouv. Arch. Mus.* x. 135.

Amelanchier Canadensis, var. **alnifolia**, Torrey & Gray, *Fl. N. Am.* i. 473. — Walpers, *Rep.* ii. 55. — Dietrich, *Syn.* iii. 158. — Torrey, *Pacific R. R. Rep.* iv. 85; *Bot. Mex. Bound. Surv.* 64; *Bot. Wilkes Explor. Exped.* 291. — Hooker, *Lond. Jour. Bot.* vi. 220. — Gray, *Man.* 130. — Newberry, *Pacific R. R. Rep.* vi. 73. — Cooper, *Pacific R. R. Rep.* xii. pt. ii. 30. — Watson, *King's Rep.* v. 92.

Amelanchier Canadensis, var. **pumila**, Torrey & Gray, *Fl. N. Am.* i. 474. — Walpers, *Rep.* ii. 55. — Dietrich, *Syn.* iii. 158.

Amelanchier pumila, Roemer, *Fam. Nat. Syn.* iii. 145.

Amelanchier Canadensis, var. **oblongifolia**, Bentham, *Pl. Hartweg.* 309 (not Torrey & Gray).

Amelanchier diversifolia, var. **alnifolia**, Torrey, *Frémont's Rep.* 89.

Amelanchier Canadensis, Anderson, *Cat. Pl. Nev.* 120 (not Medicus).

? **Amelanchier glabra**, Greene, *Fl. Francis.* i. 52.

? **Amelanchier pallida**, Greene, *Fl. Francis.* i. 53.

A tree, occasionally forty feet in height, with a single straight trunk six to ten inches in diameter, or more often with a cluster of slender stems rising from the ground; or usually a shrub only a foot or two in height. The bark of the trunk is an eighth of an inch thick, smooth or slightly fissured, and light brown somewhat tinged with red. The branches are green at first and glabrous, pilose with long pale hairs or coated with pubescence, and in their first winter are stout, bright red or plum-color, glabrous or rarely puberulous, and more or less marked by small pale lenticels. The winter-buds are acute, a quarter of an inch long, and covered with chestnut-brown glabrous or occasionally pilose scales; the scales of the inner ranks at maturity are ovate, acute, brightly colored, covered with pale silky hairs, and from a half to three quarters of an inch in length. The leaves are broadly ovate to orbicular or occasionally oblong-ovate, rounded or rarely acute at the apex, rounded or subcordate at the base, and sharply and coarsely serrate above the middle, with incurved rigid teeth; when they unfold they are coated on the lower surface with thick pale tomentum, and are often pilose on the upper surface; but they soon become glabrous, and at maturity are membranaceous to subcoriaceous, dark green above and pale or sometimes rufous below, or, when the plants grow in the dry climate of the interior, gray-green on both surfaces and often puberulous below; they are an inch to an inch and a half in length and in breadth, with slender midribs and veins, and are borne on slender petioles half an inch long. The stipules are linear, acute, red-brown, sometimes an inch in length, and caducous. The flowers, which appear from April on the shores of Puget Sound to the middle of June on the high mountains of Montana, are produced in erect glabrous or pubescent racemes an inch to an inch and a half in length on short pedicels furnished near the middle with linear acute colored bractlets which in falling leave conspicuous scars. The calyx is cup-shaped and glabrous, pilose or pubescent on the outer surface, with linear acute lobes glabrous or coated with pubescence on the inner surface. The petals are narrowly oblong to obovate, rounded or acute at the apex, and from a quarter of an inch to an inch in length. The ovaries are pubescent or puberulous. The fruit ripens from June to September, and is sweet and juicy; it is subglobose, dark blue or almost black, with a glaucous bloom, and from half an

inch to nearly an inch in diameter. The seeds are an eighth of an inch long, with a lustrous red-brown coat.[1]

Amelanchier alnifolia is distributed from the valley of the Yukon River in latitude 62° 45′ north,[2] southward through the coast ranges of northeastern America and on the mountain ranges of the western and interior parts of the continent, extending in California to the southern boundary of the state, and eastward through British Columbia, the Saskatchewan, and Manitoba, to the western shores of Lake Superior,[3] and to northern Michigan, Nebraska,[4] and the Rocky Mountains of Colorado[5] and New Mexico.[6]

The wood of *Amelanchier alnifolia* is heavy, hard, and close-grained; it is light brown and contains numerous obscure medullary rays. The specific gravity of the absolutely dry wood is 0.8262, a cubic foot weighing 51.55 pounds.

The nutritious and abundant fruit of the Service Berry is an important article of food with the Indians of western America, who gather and dry it in large quantities.[7]

Amelanchier alnifolia attains its largest size and occasionally assumes the habit of a tree on the islands and rich bottom-lands of the lower Columbia River and on the small prairies which occur in Washington in the neighborhood of Puget Sound, where it grows in gravelly soil near the borders of small ponds, and often forms thickets of considerable extent, or is associated with the Oregon Hawthorn, the Crab-apple, and the Choke Cherry. In the interior it is confined to high elevations, in California frequently ascending ten thousand feet above the level of the ocean, sometimes near the borders of streams or alpine meadows, or often on high hillsides where, as a low shrub, it forms thickets which cover areas several hundred acres in extent.

Amelanchier alnifolia was noticed early in this century by the party of explorers who, under the leadership of Lewis and Clark, first crossed North America;[8] and it was introduced into cultivation by David Douglas who, in 1826, sent seeds to the London Horticultural Society. In the Arnold Arboretum it produces fruit every year.

[1] In the different parts of the immense territory over which it is distributed *Amelanchier alnifolia* varies not only in size and habit, but in the texture and color of the leaves, in the amount and character of the pubescence of the calyx, and in the size of the flowers; at high elevations in the dry interior its foliage, like that of many plants in these regions, is pale green on both sides, and the bark of the branches and stems is much lighter than on plants which have grown in the more humid climate of the coast. The extreme forms of this species, however, are connected by intermediate forms, and it is not probable that western America contains more than a single species of Amelanchier, and this, at the extreme eastern limits of its range, is not always easily distinguished from some of the broad-leaved forms of *Amelanchier Canadensis* of the eastern states.

[2] Macoun, *Cat. Can. Pl.* i. 148.

[3] Macoun, *l. c.* 522.

[4] Bessey, *Bull. Agric. Exper. Stat. Nebraska*, iv. art. iv. 20.

[5] Coulter, *Man. Rocky Mt. Bot.* 89.

[6] Gray, *Mem. Am. Acad.* n. ser. iv. 42 (*Pl. Fendler.*).

[7] "In a great number of localities service-berries are stored for winter use by the Indians. They are gathered where most abundant, crushed and made into a paste which is spread out on bark or stones in the sun until it is thoroughly dried. It is then put in sacks, and during the winter serves to give variety to their diet which otherwise consists of flesh or dried fish." (Newberry, *Food and Fibre Plants of the North American Indians, Popular Science Monthly*, xxxii. 43. See, also, R. Brown (Campst.), *Trans. Bot. Soc. Edinburgh*, ix. 384.)

[8] *History of the Expedition under the Command of Captains Lewis and Clark to the Sources of the Missouri, thence across the Rocky Mountains and down the River Columbia to the Pacific Ocean*, ii. 505.

EXPLANATION OF THE PLATE.

PLATE CXCVI. AMELANCHIER ALNIFOLIA.

1. A flowering branch, natural size.
2. Vertical section of a flower, the ends of the petals removed, enlarged.
3. A fruiting branch, natural size.
4. Vertical section of a fruit, enlarged.
5. A seed, natural size.
6. An embryo, much magnified.
7. A winter branchlet, natural size.

C.E. Faxon del. *Himely sc.*

AMELANCHIER ALNIFOLIA, Nutt.

A. Riocreux direx.t *Imp. R. Taneur, Paris.*

LYONOTHAMNUS.

FLOWERS perfect; calyx 5-lobed, the lobes imbricated in æstivation, persistent; petals 5, imbricated in æstivation; stamens 15; ovaries 2, 1-celled; ovules 4 in each cell, suspended. Fruit follicular. Leaves opposite, simple or pinnately divided, persistent.

Lyonothamnus, Gray, *Proc. Am. Acad.* ser. 2, xii. 291.

A tree or shrub, with scaly bark exfoliating in long strips, stout terete pubescent ultimately glabrous branchlets, and scaly buds. Leaves opposite, long-petiolate, lanceolate, acuminate, rounded or wedge-shaped at the base, entire or finely crenulate-serrate or serrulate-lobulate below the middle, or on the same branch irregularly pinnately parted into three to eight linear lanceolate remote lobulate segments, coriaceous, transversely many-veined, dark green on the upper surface, paler and more or less coated with pubescence on the lower, persistent; stipules lanceolate, acute, minute, caducous. Flowers on slender pedicels in broad ample compound terminal pubescent cymes. Bracts and bractlets acute, minute, persistent. Calyx-tube hemispherical, one to three-bracteolate, tomentose on the outer surface, the lobes nearly triangular, slightly keeled, apiculate, persistent. Disk lining the calyx-tube, lanate, the slightly thickened margin ten-lobed. Petals five, orbicular, sessile, white. Stamens fifteen, inserted with the petals on the margin of the disk in pairs opposite the petals and singly opposite the sepals; filaments subulate, incurved, as long as the petals; anthers oblong, attached on the back below the middle, introrse, two-celled, the cells opening longitudinally. Pistils two, inserted in the bottom of the calyx-tube; ovaries ovate, flattened on the inner surface by mutual pressure, glandular-setulose, contracted into thick spreading styles; stigmas capitate, truncate; ovules four in each cell, oblong, suspended, anatropous; micropyle superior, the raphe ventral. Fruit composed of two woody ovate glandular four-seeded follicles, dehiscent on the ventral and partially dehiscent on the dorsal suture. Seeds ovate-oblong, pointed at both ends; albumen thin; testa light brown, thin, and membranaceous; hilum orbicular, apical, the raphe broad and wing-like. Cotyledons oblong-acuminate, twice the length of the straight radicle directed towards the hilum.

The wood of Lyonothamnus is very heavy, hard, and close-grained, with a satiny surface susceptible of receiving a good polish. It contains numerous thin medullary rays, the layers of annual growth being hardly distinguishable, and is bright clear red faintly tinged with orange. The specific gravity of the absolutely dry wood is 0.8029, a cubic foot weighing 50.05 pounds.[1]

Lyonothamnus was named in honor of William S. Lyon, who discovered it in July, 1884,[2] on the island of Santa Catalina, California. It is represented by a single species.

[1] *Garden and Forest*, iii. 344.

[2] William Scrugham Lyon, forester of the California State Board of Forestry, was born at White Plains, New York, in November, 1852, and educated at the College of the State of New York and at the Massachusetts Agricultural College. The acquaintance of Dr. John Torrey, made in boyhood, laid the foundation of Mr. Lyon's taste for the study of plants, which, after his removal to California in 1871, he was able at length fully to gratify. In 1884 and 1885 he explored the little known island of Santa Catalina, one of the San Bernardino group, discovering several undescribed species of plants, and making useful observations on the character and distribution of its peculiar flora. Under the title of *A Flora of our Southwestern Archipelago*, Mr. Lyon published, in 1886, the scientific results of these journeys in the eleventh volume of the *Botanical Gazette*.

LYONOTHAMNUS FLORIBUNDUS.

Iron Wood.

Lyonothamnus floribundus, Gray, *Proc. Am. Acad.* ser. 2, xii. 292. — T. S. Brandegee, *Zoë*, i. 111, 136, t. 4.

Lyonothamnus asplenifolius, Greene, *Bull. Cal. Acad.* i. 187; ii. 149, 397, t. 6. — T. S. Brandegee, *Proc. Cal. Acad.* ser. 2, i. 210. — Sargent, *Garden and Forest*, ii. 435.

Lyonothamnus floribundus, var. **asplenifolius**, T. S. Brandegee, *Zoë*, i. 136.

A bushy tree, rarely thirty to forty feet in height, with a single trunk sometimes eight or ten inches in diameter, but usually with a number of tall stems rising from the ground; or, in exposed situations, reduced to a low shrub. The bark of the trunk is a third of an inch thick and dark red-brown, and is composed of many thin papery layers, five or six of which, after partially separating, remain on the stem broken into long loose strips. The branchlets are at first pale orange-color and, like the branches of the inflorescence, are coated with pubescence which soon disappears, and at the end of their first season they are bright red and lustrous. The leaves, which vary from four to eight inches in length and from half an inch in width when entire to four inches when pinnately divided, are coated on the lower surface, when they unfold, with thick white deciduous tomentum, and are dark green and rather lustrous on the upper surface, and yellow-green, glabrous, or pubescent on the lower, with orange-colored midribs. The inflorescence, which appears in June and July, varies from four to eight inches across, the individual flowers being from an eighth to a quarter of an inch in diameter. The fruit ripens in August and September, and is three sixteenths of an inch long.[1]

Lyonothamnus floribundus is known only on the islands of Santa Catalina and Santa Cruz off the coast of California, where it is found growing in dry rocky soil on the steep slopes of cañons. It is most abundant on Santa Cruz, where many fine groves exist on the northern shore of the island, and where it attains its largest size. On Santa Catalina it is much smaller, rarely arborescent in habit, and usually produces simple or sinuate or lobulate leaves.

Lyonothamnus floribundus is an interesting and handsome plant. It is the only North American representative of its family which attains the size and habit of a tree. The beauty of its multiform persistent leaves, and the ample size and abundance of its clusters of flowers, will cause it to be valued as an ornament in the gardens of temperate countries.

[1] Plants of Lyonothamnus with simple leaves and with pinnately divided leaves appear distinct, but on Santa Catalina trees were found by Mr. T. S. Brandegee on which both the narrow simple leaves and the divided leaves of all the different forms occurred, and his conclusion that the plants of Santa Catalina and of Santa Cruz are merely heterophyllous forms of one species is doubtless correct (*Zoë*, i. 111).

EXPLANATION OF THE PLATE.

PLATE CXCVII. LYONOTHAMNUS FLORIBUNDUS.

1. A flowering branch, natural size.
2. Diagram of a flower.
3. A flower, enlarged.
4. Vertical section of a flower, enlarged.
5. A stamen, enlarged.
6. A gynœcium, enlarged.
7. An ovule, much magnified.
8. A cluster of fruit, natural size.
9. A fruit, enlarged.
10. Ventral view of an open carpel, enlarged.
11. Cross section of a fruit, enlarged.
12. Vertical section of a fruit, enlarged.
13. Vertical section of a seed, enlarged.
14. A seed divided transversely, enlarged.
15. An embryo, much magnified.
16. A simple leaf, natural size.

C.E.Faxon del.

Picart fr. sc.

LYONOTHAMNUS FLORIBUNDUS. Gray.

A. Riocreux direx.t

Imp R. Taneur, Paris.

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